

Ref. No. : BBHKN-20-00010
 Date : August 28, 2020

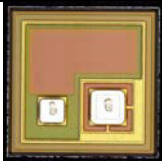
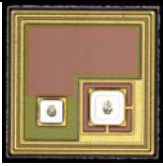
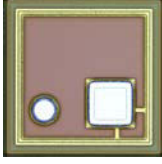

CHANGE NOTICE for DOUBLE MOLDED COUPLER

Change of transistor chip

We would appreciate your continuous patronage of our semiconductor products.
 With regards to our Photo coupler product which is used at your company, please be noticed the following change is planned.
 Your guidance and continued support would be highly appreciated.

1. Products to be affected : Double molded couplers with transistor output are to be affected*

2. Description of change : The following changes are planned.

No.	Content of change and reason	Before change No Equi-potential Ring	After change Add Equi-potential Ring	Products to be affected*
1)	Change of photo detecting chip TLP185 (Representative)			TLP184/TLP185/TLP290/TLP290-4/TLP291/ TLP291-4/TLP385/TLP620M
2)	Change of photo detecting chip TLP293 (Representative)			TLP182/TLP183/TLP292/TLP292-4/ TLP293/TLP293-4/TLP383

* See attached file for detailed part numbers (Product list_BBHKN-20-00010)

3. Purpose of change : Consolidation of photo detecting chips.

4. Product characteristics :

Since it is a consolidation of photo detecting chips, no change is expected in the product design and process. The change does not affect the initial characteristics and reliability before/after the change.

5. Effective date of the change :

We plan this change to be effective from the production of November 2020.

6. Request :

It would be appreciated if you could notify through our Sales representative in case of any inconvenience relating to this change. **Notification due date : October 16, 2020**

If Toshiba does not receive any reply with regards to this change by the due above date, it will be assumed that the change is acceptable.

Sincerely yours,



H. Matsuo / Manager
 Quality Planning Group
 Quality Assurance Department
 Buzen Toshiba Electronics Corporation

<Drafted by : Uchino>

Generic Toshiba Part Number	Internal Toshiba Part Number	Generic Toshiba Part Number	Internal Toshiba Part Number
TLP182(BL,E	TLP182(BL,E(T	TLP291(MBJGBTLSE	TLP291(MBJGBTLSE(T
TLP182(BLL,E	TLP182(BLL,E(T	TLP291(MBS-TP,SE	TLP291(MBS-TP,SE(T
TLP182(BL-TPL,E	TLP182(BL-TPL,E(T	TLP291(SE	TLP291(SE(T
TLP182(BL-TPR,E	TLP182(BL-TPR,E(T	TLP291(TP,E	TLP291(TP,E(O
TLP182(E	TLP182(E(T	TLP291(TP,E	TLP291(TP,E(T
TLP182(GB,E	TLP182(GB,E(T	TLP291(TP,SE	TLP291(TP,SE(T
TLP182(GB-TPL,E	TLP182(GB-TPL,E(T	TLP291(TPR,SE	TLP291(TPR,SE(T
TLP182(GB-TPR,E	TLP182(GB-TPR,E(T	TLP291(UG-TPR,E	TLP291(UG-TPR,E(O
TLP182(GR,E	TLP182(GR,E(T	TLP291(UG-TPR,SE	TLP291(UG-TPR,SE(T
TLP182(GR-TPL,E	TLP182(GR-TPL,E(T	TLP291(V4,E	TLP291(V4,E(O
TLP182(GR-TPR,E	TLP182(GR-TPR,E(T	TLP291(V4,SE	TLP291(V4,SE(T
TLP182(TPL,E	TLP182(TPL,E(T	TLP291(V4AP1TP,E	TLP291(V4AP1TP,E(O
TLP182(TPR,E	TLP182(TPR,E(T	TLP291(V4AP2TP,E	TLP291(V4AP2TP,E(O
TLP182(V4,E	TLP182(V4,E(T	TLP291(V4AP3TPSE	TLP291(V4AP3TPSE(T
TLP182(V4-BL,E	TLP182(V4-BL,E(T	TLP291(V4-BL,SE	TLP291(V4-BL,SE(T
TLP182(V4-BLTL,E	TLP182(V4-BLTL,E(T	TLP291(V4-BLL,E	TLP291(V4-BLL,E(O
TLP182(V4-BLTR,E	TLP182(V4-BLTR,E(T	TLP291(V4-BLL,SE	TLP291(V4-BLL,SE(T
TLP182(V4-GB,E	TLP182(V4-GB,E(T	TLP291(V4BLTP,SE	TLP291(V4BLTP,SE(T
TLP182(V4-GBTL,E	TLP182(V4-GBTL,E(T	TLP291(V4BLTR,SE	TLP291(V4BLTR,SE(T
TLP182(V4-GBTR,E	TLP182(V4-GBTR,E(T	TLP291(V4B-TP,E	TLP291(V4B-TP,E(O
TLP182(V4-GR,E	TLP182(V4-GR,E(T	TLP291(V4B-TP,SE	TLP291(V4B-TP,SE(T
TLP182(V4-GRTL,E	TLP182(V4-GRTL,E(T	TLP291(V4B-TR,SE	TLP291(V4B-TR,SE(T
TLP182(V4-GRTR,E	TLP182(V4-GRTR,E(T	TLP291(V4-GB,E	TLP291(V4-GB,E(O
TLP182(V4MBGRTLE	TLP182(V4MBGRTLE(T	TLP291(V4-GB,SE	TLP291(V4-GB,SE(T
TLP182(V4MBYTL,E	TLP182(V4MBYTL,E(T	TLP291(V4GB-TP,E	TLP291(V4GB-TP,E(O
TLP182(V4-TPL,E	TLP182(V4-TPL,E(T	TLP291(V4GB-TP,E	TLP291(V4GB-TP,E(T
TLP182(V4-TPR,E	TLP182(V4-TPR,E(T	TLP291(V4GBTP,SE	TLP291(V4GBTP,SE(O
TLP182(V4-Y,E	TLP182(V4-Y,E(T	TLP291(V4GBTP,SE	TLP291(V4GBTP,SE(T
TLP182(V4-YTPL,E	TLP182(V4-YTPL,E(T	TLP291(V4GBTR,SE	TLP291(V4GBTR,SE(O
TLP182(V4-YTPR,E	TLP182(V4-YTPR,E(T	TLP291(V4GBTR,SE	TLP291(V4GBTR,SE(T
TLP182(Y,E	TLP182(Y,E(T	TLP291(V4GH-TP,E	TLP291(V4GH-TP,E(O
TLP182(Y-TPL,E	TLP182(Y-TPL,E(T	TLP291(V4GH-TP,E	TLP291(V4GH-TP,E(T
TLP182(Y-TPR,E	TLP182(Y-TPR,E(T	TLP291(V4GHTP,SE	TLP291(V4GHTP,SE(T
TLP183(BL,E	TLP183(BL,E(T	TLP291(V4GH-TR,E	TLP291(V4GH-TR,E(O
TLP183(BLL,E	TLP183(BLL,E(T	TLP291(V4GH-TR,E	TLP291(V4GH-TR,E(T
TLP183(BLL-TPL,E	TLP183(BLL-TPL,E(T	TLP291(V4GHTR,SE	TLP291(V4GHTR,SE(T
TLP183(BLL-TPR,E	TLP183(BLL-TPR,E(T	TLP291(V4GHTRPPE	TLP291(V4GHTRPPE(O
TLP183(BL-TPL,E	TLP183(BL-TPL,E(T	TLP291(V4GL-TP,E	TLP291(V4GL-TP,E(O
TLP183(BL-TPR,E	TLP183(BL-TPR,E(T	TLP291(V4GL-TP,E	TLP291(V4GL-TP,E(T
TLP183(E	TLP183(E(T	TLP291(V4GLTP,SE	TLP291(V4GLTP,SE(T
TLP183(GB,E	TLP183(GB,E(T	TLP291(V4GL-TR,E	TLP291(V4GL-TR,E(O
TLP183(GBTL-PP,E	TLP183(GBTL-PP,E(T	TLP291(V4GL-TR,E	TLP291(V4GL-TR,E(T
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TLP183(GRH-TPL,E	TLP183(GRH-TPL,E(T	TLP291(V4-GRH,E	TLP291(V4-GRH,E(O
TLP183(GRH-TPR,E	TLP183(GRH-TPR,E(T	TLP291(V4-GRH,SE	TLP291(V4-GRH,SE(T
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TLP183(GRL-TPR,E	TLP183(GRL-TPR,E(T	TLP291(V4GR-TP,E	TLP291(V4GR-TP,E(O
TLP183(GR-TPL,E	TLP183(GR-TPL,E(T	TLP291(V4GR-TP,E	TLP291(V4GR-TP,E(T
TLP183(GR-TPR,E	TLP183(GR-TPR,E(T	TLP291(V4GRTP,SE	TLP291(V4GRTP,SE(T
TLP183(HOTBLTL,E	TLP183(HOTBLTL,E(T	TLP291(V4GRTR,SE	TLP291(V4GRTR,SE(T
TLP183(TPL,E	TLP183(TPL,E(T	TLP291(V4HSSTPSE	TLP291(V4HSSTPSE(T
TLP183(TPR,E	TLP183(TPR,E(T	TLP291(V4SCBTRSE	TLP291(V4SCBTRSE(T
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TLP183(V4BLLTL,E	TLP183(V4BLLTL,E(T	TLP291(V4-Y,E	TLP291(V4-Y,E(O
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TLP183(V4-BLTL,E	TLP183(V4-BLTL,E(T	TLP291(V4-YH,E	TLP291(V4-YH,E(O
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TLP183(V4-GHTL,E	TLP183(V4-GHTL,E(T	TLP291(V4YHTR,SE	TLP291(V4YHTR,SE(T
TLP183(V4-GHTR,E	TLP183(V4-GHTR,E(T	TLP291(V4-YL,E	TLP291(V4-YL,E(O
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TLP183(V4-GLTR,E	TLP183(V4-GLTR,E(T	TLP291(V4YL-TP,E	TLP291(V4YL-TP,E(O
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TLP183(V4-GRTL,E	TLP183(V4-GRTL,E(T	TLP291(V4Y-TR,SE	TLP291(V4Y-TR,SE(O
TLP183(V4-GRTR,E	TLP183(V4-GRTR,E(T	TLP291(V4Y-TR,SE	TLP291(V4Y-TR,SE(T
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TLP183(V4-TPR,E	TLP183(V4-TPR,E(T	TLP291(VMBGBTPSE	TLP291(VMBGBTPSE(T
TLP183(V4-Y,E	TLP183(V4-Y,E(T	TLP291(Y,E	TLP291(Y,E(O
TLP183(V4-YH,E	TLP183(V4-YH,E(T	TLP291(Y,SE	TLP291(Y,SE(T
TLP183(V4-YHTL,E	TLP183(V4-YHTL,E(T	TLP291(YH,E	TLP291(YH,E(O
TLP183(V4-YHTR,E	TLP183(V4-YHTR,E(T	TLP291(YH,SE	TLP291(YH,SE(T
TLP183(V4-YTPL,E	TLP183(V4-YTPL,E(T	TLP291(YH-TP,E	TLP291(YH-TP,E(O
TLP183(V4-YTPR,E	TLP183(V4-YTPR,E(T	TLP291(YH-TP,E	TLP291(YH-TP,E(T
TLP183(Y,E	TLP183(Y,E(T	TLP291(YH-TP,SE	TLP291(YH-TP,SE(T
TLP183(YH,E	TLP183(YH,E(T	TLP291(YH-TPR,SE	TLP291(YH-TPR,SE(T
TLP183(YH-TPL,E	TLP183(YH-TPL,E(T	TLP291(YL,E	TLP291(YL,E(O
TLP183(YH-TPR,E	TLP183(YH-TPR,E(T	TLP291(YL-TP,E	TLP291(YL-TP,E(O
TLP183(Y-TPL,E	TLP183(Y-TPL,E(T	TLP291(YL-TP,SE	TLP291(YL-TP,SE(T
TLP183(Y-TPR,E	TLP183(Y-TPR,E(T	TLP291(YL-TPR,SE	TLP291(YL-TPR,SE(T
TLP184(4DLGLTRSE	TLP184(4DLGLTRSE(T	TLP291(Y-TP,E	TLP291(Y-TP,E(O
TLP184(4MBGRTLSE	TLP184(4MBGRTLSE(T	TLP291(Y-TP,SE	TLP291(Y-TP,SE(T

TLP184(BL,E	TLP184(BL,E(T	TLP291(Y-TPR,SE	TLP291(Y-TPR,SE(T
TLP184(BL,SE	TLP184(BL,SE(T	TLP291-4(BRGBTPE	TLP291-4(BRGBTPE(T
TLP184(BLL,E	TLP184(BLL,E(O	TLP291-4(BRZGB,E	TLP291-4(BRZGB,E(T
TLP184(BLL,SE	TLP184(BLL,SE(T	TLP291-4(E	TLP291-4(E(T
TLP184(BLL-TL,SE	TLP184(BLL-TL,SE(T	TLP291-4(GB,E	TLP291-4(GB,E(T
TLP184(BLL-TPL,E	TLP184(BLL-TPL,E(O	TLP291-4(GB-TP,E	TLP291-4(GB-TP,E(T
TLP184(BLL-TPR,E	TLP184(BLL-TPR,E(O	TLP291-4(MBGBTPE	TLP291-4(MBGBTPE(T
TLP184(BLL-TR,SE	TLP184(BLL-TR,SE(T	TLP291-4(OAGBTPE	TLP291-4(OAGBTPE(T
TLP184(BL-TPL,E	TLP184(BL-TPL,E(T	TLP291-4(OMA-TPE	TLP291-4(OMA-TPE(T
TLP184(BL-TPL,SE	TLP184(BL-TPL,SE(T	TLP291-4(TP,E	TLP291-4(TP,E(T
TLP184(BL-TPR,E	TLP184(BL-TPR,E(T	TLP291-4(UG-TP,E	TLP291-4(UG-TP,E(T
TLP184(BL-TPR,SE	TLP184(BL-TPR,SE(T	TLP291-4(V4,E	TLP291-4(V4,E(O
TLP184(E	TLP184(E(O	TLP291-4(V4,E	TLP291-4(V4,E(T
TLP184(E	TLP184(E(T	TLP291-4(V4-GB,E	TLP291-4(V4-GB,E(O
TLP184(GB,E	TLP184(GB,E(O	TLP291-4(V4-GB,E	TLP291-4(V4-GB,E(T
TLP184(GB,E	TLP184(GB,E(T	TLP291-4(V4GBTPE	TLP291-4(V4GBTPE(O
TLP184(GB,SE	TLP184(GB,SE(T	TLP291-4(V4GBTPE	TLP291-4(V4GBTPE(T
TLP184(GB-TPL,E	TLP184(GB-TPL,E(O	TLP291-4(V4-TP,E	TLP291-4(V4-TP,E(O
TLP184(GB-TPL,E	TLP184(GB-TPL,E(T	TLP291-4(V4-TP,E	TLP291-4(V4-TP,E(T
TLP184(GB-TPL,SE	TLP184(GB-TPL,SE(T	TLP291-4(VMBGBLE	TLP291-4(VMBGBLE(T
TLP184(GB-TPR,E	TLP184(GB-TPR,E(O	TLP292(4MBGRTL,E	TLP292(4MBGRTL,E(T
TLP184(GB-TPR,E	TLP184(GB-TPR,E(T	TLP292(BL,E	TLP292(BL,E(T
TLP184(GB-TPR,SE	TLP184(GB-TPR,SE(T	TLP292(BL-TPL,E	TLP292(BL-TPL,E(T
TLP184(GR,E	TLP184(GR,E(O	TLP292(BL-TPR,E	TLP292(BL-TPR,E(T
TLP184(GR,E	TLP184(GR,E(T	TLP292(E	TLP292(E(T
TLP184(GR,SE	TLP184(GR,SE(T	TLP292(GB,E	TLP292(GB,E(T
TLP184(GR-TPL,E	TLP184(GR-TPL,E(O	TLP292(GB-TPL,E	TLP292(GB-TPL,E(T
TLP184(GR-TPL,E	TLP184(GR-TPL,E(T	TLP292(GB-TPR,E	TLP292(GB-TPR,E(T
TLP184(GR-TPL,SE	TLP184(GR-TPL,SE(T	TLP292(GR,E	TLP292(GR,E(T
TLP184(GR-TPR,E	TLP184(GR-TPR,E(O	TLP292(GR-TPL,E	TLP292(GR-TPL,E(T
TLP184(GR-TPR,E	TLP184(GR-TPR,E(T	TLP292(GR-TPR,E	TLP292(GR-TPR,E(T
TLP184(GR-TPR,SE	TLP184(GR-TPR,SE(T	TLP292(HITBLTL,E	TLP292(HITBLTL,E(T
TLP184(HO-TPL,E	TLP184(HO-TPL,E(O	TLP292(MB-GRTL,E	TLP292(MB-GRTL,E(T
TLP184(HO-TPL,SE	TLP184(HO-TPL,SE(T	TLP292(NOMIBLTLE	TLP292(NOMIBLTLE(T
TLP184(MBGRTL,SE	TLP184(MBGRTL,SE(T	TLP292(NOMIGBTLE	TLP292(NOMIGBTLE(T
TLP184(SE	TLP184(SE(T	TLP292(NOMIGRTLE	TLP292(NOMIGRTLE(T
TLP184(TPL,E	TLP184(TPL,E(O	TLP292(TPL,E	TLP292(TPL,E(T
TLP184(TPL,E	TLP184(TPL,E(T	TLP292(TPR,E	TLP292(TPR,E(T
TLP184(TPL,SE	TLP184(TPL,SE(T	TLP292(V4,E	TLP292(V4,E(T
TLP184(TPR,E	TLP184(TPR,E(O	TLP292(V4-BL,E	TLP292(V4-BL,E(T
TLP184(TPR,SE	TLP184(TPR,SE(T	TLP292(V4-BLTL,E	TLP292(V4-BLTL,E(T
TLP184(V4,E	TLP184(V4,E(O	TLP292(V4-BLTR,E	TLP292(V4-BLTR,E(T
TLP184(V4,SE	TLP184(V4,SE(T	TLP292(V4-GB,E	TLP292(V4-GB,E(T
TLP184(V4-BLL,E	TLP184(V4-BLL,E(O	TLP292(V4-GBTL,E	TLP292(V4-GBTL,E(T
TLP184(V4-BLL,SE	TLP184(V4-BLL,SE(T	TLP292(V4-GBTR,E	TLP292(V4-GBTR,E(T
TLP184(V4BLTL,SE	TLP184(V4BLTL,SE(T	TLP292(V4-GR,E	TLP292(V4-GR,E(T
TLP184(V4BLTR,SE	TLP184(V4BLTR,SE(T	TLP292(V4-GRTL,E	TLP292(V4-GRTL,E(T

TLP184(V4B-TL,E	TLP184(V4B-TL,E(O	TLP292(V4-GRTR,E	TLP292(V4-GRTR,E(T
TLP184(V4B-TL,SE	TLP184(V4B-TL,SE(T	TLP292(V4SCGRTRE	TLP292(V4SCGRTRE(T
TLP184(V4B-TR,E	TLP184(V4B-TR,E(O	TLP292(V4-TPL,E	TLP292(V4-TPL,E(T
TLP184(V4B-TR,SE	TLP184(V4B-TR,SE(T	TLP292(V4-TPR,E	TLP292(V4-TPR,E(T
TLP184(V4-GB,E	TLP184(V4-GB,E(O	TLP292(V4-Y,E	TLP292(V4-Y,E(T
TLP184(V4-GB,SE	TLP184(V4-GB,SE(T	TLP292(V4-YTPL,E	TLP292(V4-YTPL,E(T
TLP184(V4GB-TL,E	TLP184(V4GB-TL,E(O	TLP292(V4-YTPR,E	TLP292(V4-YTPR,E(T
TLP184(V4GBTL,SE	TLP184(V4GBTL,SE(T	TLP292(Y,E	TLP292(Y,E(T
TLP184(V4GB-TR,E	TLP184(V4GB-TR,E(J	TLP292(Y-TPL,E	TLP292(Y-TPL,E(T
TLP184(V4GB-TR,E	TLP184(V4GB-TR,E(O	TLP292(Y-TPR,E	TLP292(Y-TPR,E(T
TLP184(V4GBTR,SE	TLP184(V4GBTR,SE(T	TLP292-4(4LGBTPE	TLP292-4(4LGBTPE(T
TLP184(V4-GR,E	TLP184(V4-GR,E(O	TLP292-4(4LGBTRE	TLP292-4(4LGBTRE(T
TLP184(V4-GR,SE	TLP184(V4-GR,SE(T	TLP292-4(4MBGBPE	TLP292-4(4MBGBPE(T
TLP184(V4GR-TL,E	TLP184(V4GR-TL,E(O	TLP292-4(E	TLP292-4(E(T
TLP184(V4GRTL,SE	TLP184(V4GRTL,SE(T	TLP292-4(GB,E	TLP292-4(GB,E(T
TLP184(V4GR-TR,E	TLP184(V4GR-TR,E(O	TLP292-4(GB-TP,E	TLP292-4(GB-TP,E(T
TLP184(V4GRTR,SE	TLP184(V4GRTR,SE(T	TLP292-4(GBTPR,E	TLP292-4(GBTPR,E(T
TLP184(V4-TPL,E	TLP184(V4-TPL,E(O	TLP292-4(LA,E	TLP292-4(LA,E(T
TLP184(V4-TPL,SE	TLP184(V4-TPL,SE(T	TLP292-4(LA-TP,E	TLP292-4(LA-TP,E(T
TLP184(V4-TPR,E	TLP184(V4-TPR,E(O	TLP292-4(LA-TR,E	TLP292-4(LA-TR,E(T
TLP184(V4-TPR,E	TLP184(V4-TPR,E(T	TLP292-4(LGB,E	TLP292-4(LGB,E(T
TLP184(V4-TPR,SE	TLP184(V4-TPR,SE(T	TLP292-4(LGBTPE	TLP292-4(LGBTPE(T
TLP184(V4-Y,E	TLP184(V4-Y,E(O	TLP292-4(LGBTR,E	TLP292-4(LGBTR,E(T
TLP184(V4-Y,SE	TLP184(V4-Y,SE(T	TLP292-4(MB-TP,E	TLP292-4(MB-TP,E(T
TLP184(V4-Y-TL,E	TLP184(V4-Y-TL,E(O	TLP292-4(TP,E	TLP292-4(TP,E(T
TLP184(V4Y-TL,SE	TLP184(V4Y-TL,SE(T	TLP292-4(TPR,E	TLP292-4(TPR,E(T
TLP184(V4-Y-TR,E	TLP184(V4-Y-TR,E(O	TLP292-4(V4,E	TLP292-4(V4,E(T
TLP184(V4Y-TR,SE	TLP184(V4Y-TR,SE(T	TLP292-4(V4-GB,E	TLP292-4(V4-GB,E(T
TLP184(Y,E	TLP184(Y,E(O	TLP292-4(V4GBTPE	TLP292-4(V4GBTPE(T
TLP184(Y,SE	TLP184(Y,SE(T	TLP292-4(V4GBTRE	TLP292-4(V4GBTRE(T
TLP184(Y-TPL,E	TLP184(Y-TPL,E(O	TLP292-4(V4-LA,E	TLP292-4(V4-LA,E(T
TLP184(Y-TPL,SE	TLP184(Y-TPL,SE(T	TLP292-4(V4LATPE	TLP292-4(V4LATPE(T
TLP184(Y-TPR,E	TLP184(Y-TPR,E(O	TLP292-4(V4LATRE	TLP292-4(V4LATRE(T
TLP184(Y-TPR,SE	TLP184(Y-TPR,SE(T	TLP292-4(V4LGB,E	TLP292-4(V4LGB,E(T
TLP185(4MBGHTLSE	TLP185(4MBGHTLSE(T	TLP292-4(V4-TP,E	TLP292-4(V4-TP,E(T
TLP185(BL,E	TLP185(BL,E(T	TLP292-4(V4-TR,E	TLP292-4(V4-TR,E(T
TLP185(BL,SE	TLP185(BL,SE(T	TLP293(BL,E	TLP293(BL,E(T
TLP185(BLL,E	TLP185(BLL,E(O	TLP293(BLL,E	TLP293(BLL,E(T
TLP185(BLL,E	TLP185(BLL,E(T	TLP293(BLL-TPL,E	TLP293(BLL-TPL,E(T
TLP185(BLL,SE	TLP185(BLL,SE(T	TLP293(BLL-TPR,E	TLP293(BLL-TPR,E(T
TLP185(BLL-TL,SE	TLP185(BLL-TL,SE(T	TLP293(BL-TPL,E	TLP293(BL-TPL,E(T
TLP185(BLL-TPL,E	TLP185(BLL-TPL,E(O	TLP293(BL-TPR,E	TLP293(BL-TPR,E(T
TLP185(BLL-TPL,E	TLP185(BLL-TPL,E(T	TLP293(BRNGBTL,E	TLP293(BRNGBTL,E(T
TLP185(BLL-TPR,E	TLP185(BLL-TPR,E(O	TLP293(BRZ-GB,E	TLP293(BRZ-GB,E(T
TLP185(BLL-TPR,E	TLP185(BLL-TPR,E(T	TLP293(BRZGBTL,E	TLP293(BRZGBTL,E(T
TLP185(BLL-TR,SE	TLP185(BLL-TR,SE(T	TLP293(BRZ-GR,E	TLP293(BRZ-GR,E(T
TLP185(BL-TPL,E	TLP185(BL-TPL,E(T	TLP293(BRZGRTL,E	TLP293(BRZGRTL,E(T

TLP185(BL-TPL,SE	TLP185(BL-TPL,SE(T	TLP293(DAIDOGB,E	TLP293(DAIDOGB,E(T
TLP185(BL-TPR,E	TLP185(BL-TPR,E(T	TLP293(E	TLP293(E(T
TLP185(BL-TPR,SE	TLP185(BL-TPR,SE(T	TLP293(GB,E	TLP293(GB,E(T
TLP185(COSGLTRSE	TLP185(COSGLTRSE(T	TLP293(GB-TPL,E	TLP293(GB-TPL,E(T
TLP185(DAIDBTLSE	TLP185(DAIDBTLSE(T	TLP293(GB-TPR,E	TLP293(GB-TPR,E(T
TLP185(E	TLP185(E(O	TLP293(GR,E	TLP293(GR,E(T
TLP185(E	TLP185(E(T	TLP293(GRH,E	TLP293(GRH,E(T
TLP185(FXMGBTLSE	TLP185(FXMGBTLSE(T	TLP293(GRH-TPL,E	TLP293(GRH-TPL,E(T
TLP185(GB,E	TLP185(GB,E(O	TLP293(GRH-TPR,E	TLP293(GRH-TPR,E(T
TLP185(GB,E	TLP185(GB,E(T	TLP293(GRL,E	TLP293(GRL,E(T
TLP185(GB,SE	TLP185(GB,SE(O	TLP293(GRL-TPL,E	TLP293(GRL-TPL,E(T
TLP185(GB,SE	TLP185(GB,SE(T	TLP293(GRL-TPR,E	TLP293(GRL-TPR,E(T
TLP185(GB-TPL,E	TLP185(GB-TPL,E(O	TLP293(GR-TPL,E	TLP293(GR-TPL,E(T
TLP185(GB-TPL,E	TLP185(GB-TPL,E(T	TLP293(GR-TPR,E	TLP293(GR-TPR,E(T
TLP185(GB-TPL,SE	TLP185(GB-TPL,SE(O	TLP293(HOBL-TL,E	TLP293(HOBL-TL,E(T
TLP185(GB-TPL,SE	TLP185(GB-TPL,SE(T	TLP293(KGES,E	TLP293(KGES,E(T
TLP185(GB-TPR,E	TLP185(GB-TPR,E(O	TLP293(MB-BLTP,E	TLP293(MB-BLTP,E(T
TLP185(GB-TPR,E	TLP185(GB-TPR,E(T	TLP293(MB-BTL,E	TLP293(MB-BTL,E(T
TLP185(GB-TPR,SE	TLP185(GB-TPR,SE(T	TLP293(MB-BTP,E	TLP293(MB-BTP,E(T
TLP185(GNNBLTRSE	TLP185(GNNBLTRSE(T	TLP293(NOHMBLTLE	TLP293(NOHMBLTLE(T
TLP185(GR,E	TLP185(GR,E(O	TLP293(NOHMGRTLE	TLP293(NOHMGRTLE(T
TLP185(GR,E	TLP185(GR,E(T	TLP293(TPL,E	TLP293(TPL,E(T
TLP185(GR,SE	TLP185(GR,SE(T	TLP293(TPR,E	TLP293(TPR,E(T
TLP185(GRH,E	TLP185(GRH,E(O	TLP293(V4,E	TLP293(V4,E(T
TLP185(GRH,SE	TLP185(GRH,SE(T	TLP293(V4-BL,E	TLP293(V4-BL,E(T
TLP185(GRH-TL,SE	TLP185(GRH-TL,SE(T	TLP293(V4-BLL,E	TLP293(V4-BLL,E(T
TLP185(GRH-TPL,E	TLP185(GRH-TPL,E(O	TLP293(V4BLLTL,E	TLP293(V4BLLTL,E(T
TLP185(GRH-TPR,E	TLP185(GRH-TPR,E(O	TLP293(V4BLLTR,E	TLP293(V4BLLTR,E(T
TLP185(GRH-TR,SE	TLP185(GRH-TR,SE(T	TLP293(V4-BLTL,E	TLP293(V4-BLTL,E(T
TLP185(GRL,E	TLP185(GRL,E(O	TLP293(V4-BLTR,E	TLP293(V4-BLTR,E(T
TLP185(GRL,SE	TLP185(GRL,SE(T	TLP293(V4-GB,E	TLP293(V4-GB,E(T
TLP185(GRL-TL,SE	TLP185(GRL-TL,SE(T	TLP293(V4-GBTL,E	TLP293(V4-GBTL,E(T
TLP185(GRL-TPL,E	TLP185(GRL-TPL,E(O	TLP293(V4-GBTR,E	TLP293(V4-GBTR,E(T
TLP185(GRL-TPR,E	TLP185(GRL-TPR,E(O	TLP293(V4-GHTL,E	TLP293(V4-GHTL,E(T
TLP185(GRL-TPR,E	TLP185(GRL-TPR,E(T	TLP293(V4-GHTR,E	TLP293(V4-GHTR,E(T
TLP185(GRL-TR,SE	TLP185(GRL-TR,SE(T	TLP293(V4-GLTL,E	TLP293(V4-GLTL,E(T
TLP185(GR-TPL,E	TLP185(GR-TPL,E(O	TLP293(V4-GLTR,E	TLP293(V4-GLTR,E(T
TLP185(GR-TPL,E	TLP185(GR-TPL,E(T	TLP293(V4-GR,E	TLP293(V4-GR,E(T
TLP185(GR-TPL,SE	TLP185(GR-TPL,SE(O	TLP293(V4-GRH,E	TLP293(V4-GRH,E(T
TLP185(GR-TPL,SE	TLP185(GR-TPL,SE(T	TLP293(V4-GRL,E	TLP293(V4-GRL,E(T
TLP185(GR-TPR,E	TLP185(GR-TPR,E(O	TLP293(V4-GRTL,E	TLP293(V4-GRTL,E(T
TLP185(GR-TPR,E	TLP185(GR-TPR,E(T	TLP293(V4-GRTR,E	TLP293(V4-GRTR,E(T
TLP185(GR-TPR,SE	TLP185(GR-TPR,SE(O	TLP293(V4SCGRTRE	TLP293(V4SCGRTRE(T
TLP185(GR-TPR,SE	TLP185(GR-TPR,SE(T	TLP293(V4-TPL,E	TLP293(V4-TPL,E(T
TLP185(GR-TPRS,E	TLP185(GR-TPRS,E(O	TLP293(V4-TPR,E	TLP293(V4-TPR,E(T
TLP185(HBSGRTLSE	TLP185(HBSGRTLSE(T	TLP293(V4-Y,E	TLP293(V4-Y,E(T
TLP185(HITMGBTLE	TLP185(HITMGBTLE(O	TLP293(V4-YH,E	TLP293(V4-YH,E(T

TLP185(HOGB-TL,E	TLP185(HOGB-TL,E(O	TLP293(V4-YHTL,E	TLP293(V4-YHTL,E(T
TLP185(HOGBTL,SE	TLP185(HOGBTL,SE(T	TLP293(V4-YHTR,E	TLP293(V4-YHTR,E(T
TLP185(HOTGRTLSE	TLP185(HOTGRTLSE(T	TLP293(V4-YTPL,E	TLP293(V4-YTPL,E(T
TLP185(KWJGBTLSE	TLP185(KWJGBTLSE(T	TLP293(V4-YTPR,E	TLP293(V4-YTPR,E(T
TLP185(KWJGRTLSE	TLP185(KWJGRTLSE(T	TLP293(Y,E	TLP293(Y,E(T
TLP185(NORGH TLSE	TLP185(NORGH TLSE(T	TLP293(YH,E	TLP293(YH,E(T
TLP185(PSEGBTL,E	TLP185(PSEGBTL,E(O	TLP293(YH-TPL,E	TLP293(YH-TPL,E(T
TLP185(PSEGBTLSE	TLP185(PSEGBTLSE(T	TLP293(YH-TPR,E	TLP293(YH-TPR,E(T
TLP185(SE	TLP185(SE(T	TLP293(Y-TPL,E	TLP293(Y-TPL,E(T
TLP185(SIEMTR,SE	TLP185(SIEMTR,SE(T	TLP293(Y-TPR,E	TLP293(Y-TPR,E(T
TLP185(TPL,E	TLP185(TPL,E(O	TLP293-4(4LGBTPE	TLP293-4(4LGBTPE(T
TLP185(TPL,E	TLP185(TPL,E(T	TLP293-4(4LGBTRE	TLP293-4(4LGBTRE(T
TLP185(TPL,SE	TLP185(TPL,SE(T	TLP293-4(4MBGBPE	TLP293-4(4MBGBPE(T
TLP185(TPR,E	TLP185(TPR,E(O	TLP293-4(BRGBTPE	TLP293-4(BRGBTPE(T
TLP185(TPR,SE	TLP185(TPR,SE(T	TLP293-4(BRZGB,E	TLP293-4(BRZGB,E(T
TLP185(UR-GRTR,E	TLP185(UR-GRTR,E(O	TLP293-4(E	TLP293-4(E(T
TLP185(URGRTR,SE	TLP185(URGRTR,SE(T	TLP293-4(GB,E	TLP293-4(GB,E(T
TLP185(V4,E	TLP185(V4,E(O	TLP293-4(GB-TP,E	TLP293-4(GB-TP,E(T
TLP185(V4,SE	TLP185(V4,SE(T	TLP293-4(GBTPR,E	TLP293-4(GBTPR,E(T
TLP185(V4-BLL,E	TLP185(V4-BLL,E(O	TLP293-4(HISS,E	TLP293-4(HISS,E(T
TLP185(V4-BLL,SE	TLP185(V4-BLL,SE(T	TLP293-4(LA,E	TLP293-4(LA,E(T
TLP185(V4BLTL,SE	TLP185(V4BLTL,SE(T	TLP293-4(LA-TP,E	TLP293-4(LA-TP,E(T
TLP185(V4B-TL,E	TLP185(V4B-TL,E(O	TLP293-4(LA-TR,E	TLP293-4(LA-TR,E(T
TLP185(V4B-TL,E	TLP185(V4B-TL,E(T	TLP293-4(LGB,E	TLP293-4(LGB,E(T
TLP185(V4B-TL,SE	TLP185(V4B-TL,SE(T	TLP293-4(LGBTP,E	TLP293-4(LGBTP,E(T
TLP185(V4B-TR,E	TLP185(V4B-TR,E(O	TLP293-4(LGBTR,E	TLP293-4(LGBTR,E(T
TLP185(V4B-TR,SE	TLP185(V4B-TR,SE(T	TLP293-4(MBGBTPE	TLP293-4(MBGBTPE(T
TLP185(V4-GB,E	TLP185(V4-GB,E(O	TLP293-4(MBHATLE	TLP293-4(MBHATLE(T
TLP185(V4-GB,SE	TLP185(V4-GB,SE(T	TLP293-4(TP,E	TLP293-4(TP,E(T
TLP185(V4GB-TL,E	TLP185(V4GB-TL,E(O	TLP293-4(TPR,E	TLP293-4(TPR,E(T
TLP185(V4GB-TL,E	TLP185(V4GB-TL,E(T	TLP293-4(V4,E	TLP293-4(V4,E(T
TLP185(V4GBTL,SE	TLP185(V4GBTL,SE(T	TLP293-4(V4-GB,E	TLP293-4(V4-GB,E(T
TLP185(V4GB-TR,E	TLP185(V4GB-TR,E(O	TLP293-4(V4GBTPE	TLP293-4(V4GBTPE(T
TLP185(V4GBTR,SE	TLP185(V4GBTR,SE(T	TLP293-4(V4GBTRE	TLP293-4(V4GBTRE(T
TLP185(V4GH-TL,E	TLP185(V4GH-TL,E(O	TLP293-4(V4-LA,E	TLP293-4(V4-LA,E(T
TLP185(V4GHTL,SE	TLP185(V4GHTL,SE(T	TLP293-4(V4LATPE	TLP293-4(V4LATPE(T
TLP185(V4GH-TR,E	TLP185(V4GH-TR,E(O	TLP293-4(V4LATRE	TLP293-4(V4LATRE(T
TLP185(V4GHTR,SE	TLP185(V4GHTR,SE(T	TLP293-4(V4LGB,E	TLP293-4(V4LGB,E(T
TLP185(V4GL-TL,E	TLP185(V4GL-TL,E(O	TLP293-4(V4-TP,E	TLP293-4(V4-TP,E(T
TLP185(V4GLTL,SE	TLP185(V4GLTL,SE(T	TLP293-4(V4-TR,E	TLP293-4(V4-TR,E(T
TLP185(V4GL-TR,E	TLP185(V4GL-TR,E(O	TLP383(4MBGLTL,E	TLP383(4MBGLTL,E(T
TLP185(V4GLTR,SE	TLP185(V4GLTR,SE(T	TLP383(4MBGRTL,E	TLP383(4MBGRTL,E(T
TLP185(V4-GR,E	TLP185(V4-GR,E(O	TLP383(BL,E	TLP383(BL,E(T
TLP185(V4-GR,SE	TLP185(V4-GR,SE(T	TLP383(BLL,E	TLP383(BLL,E(T
TLP185(V4-GRH,E	TLP185(V4-GRH,E(O	TLP383(BLL-TPL,E	TLP383(BLL-TPL,E(T
TLP185(V4-GRH,SE	TLP185(V4-GRH,SE(T	TLP383(BLL-TPR,E	TLP383(BLL-TPR,E(T
TLP185(V4-GRL,E	TLP185(V4-GRL,E(O	TLP383(BL-TPL,E	TLP383(BL-TPL,E(T

TLP185(V4-GRL,SE	TLP185(V4-GRL,SE(T	TLP383(BL-TPR,E	TLP383(BL-TPR,E(T
TLP185(V4GR-TL,E	TLP185(V4GR-TL,E(O	TLP383(BRZ-GB,E	TLP383(BRZ-GB,E(T
TLP185(V4GR-TL,E	TLP185(V4GR-TL,E(T	TLP383(BRZGBTL,E	TLP383(BRZGBTL,E(T
TLP185(V4GRTL,SE	TLP185(V4GRTL,SE(O	TLP383(BRZGLTL,E	TLP383(BRZGLTL,E(T
TLP185(V4GRTL,SE	TLP185(V4GRTL,SE(T	TLP383(D4,E	TLP383(D4,E(T
TLP185(V4GR-TR,E	TLP185(V4GR-TR,E(O	TLP383(D4-BL,E	TLP383(D4-BL,E(T
TLP185(V4GRTR,SE	TLP185(V4GRTR,SE(T	TLP383(D4-BLL,E	TLP383(D4-BLL,E(T
TLP185(V4HSSTLSE	TLP185(V4HSSTLSE(T	TLP383(D4BLLTL,E	TLP383(D4BLLTL,E(T
TLP185(V4MBBTLSE	TLP185(V4MBBTLSE(T	TLP383(D4BLLTR,E	TLP383(D4BLLTR,E(T
TLP185(V4SCBTRSE	TLP185(V4SCBTRSE(T	TLP383(D4BL-TL,E	TLP383(D4BL-TL,E(T
TLP185(V4-TPL,E	TLP185(V4-TPL,E(O	TLP383(D4BL-TR,E	TLP383(D4BL-TR,E(T
TLP185(V4-TPL,SE	TLP185(V4-TPL,SE(T	TLP383(D4-GB,E	TLP383(D4-GB,E(T
TLP185(V4-TPR,E	TLP185(V4-TPR,E(O	TLP383(D4GB-TL,E	TLP383(D4GB-TL,E(T
TLP185(V4-TPR,SE	TLP185(V4-TPR,SE(T	TLP383(D4GB-TR,E	TLP383(D4GB-TR,E(T
TLP185(V4-Y,E	TLP185(V4-Y,E(O	TLP383(D4GH-TL,E	TLP383(D4GH-TL,E(T
TLP185(V4-Y,SE	TLP185(V4-Y,SE(T	TLP383(D4GH-TR,E	TLP383(D4GH-TR,E(T
TLP185(V4-YH,E	TLP185(V4-YH,E(O	TLP383(D4GL-TL,E	TLP383(D4GL-TL,E(T
TLP185(V4-YH,SE	TLP185(V4-YH,SE(T	TLP383(D4GL-TR,E	TLP383(D4GL-TR,E(T
TLP185(V4YH-TL,E	TLP185(V4YH-TL,E(O	TLP383(D4-GR,E	TLP383(D4-GR,E(T
TLP185(V4YHTL,SE	TLP185(V4YHTL,SE(T	TLP383(D4-GRH,E	TLP383(D4-GRH,E(T
TLP185(V4YH-TR,E	TLP185(V4YH-TR,E(O	TLP383(D4-GRL,E	TLP383(D4-GRL,E(T
TLP185(V4-YL,E	TLP185(V4-YL,E(O	TLP383(D4GR-TL,E	TLP383(D4GR-TL,E(T
TLP185(V4-YL,SE	TLP185(V4-YL,SE(T	TLP383(D4GR-TR,E	TLP383(D4GR-TR,E(T
TLP185(V4YL-TL,E	TLP185(V4YL-TL,E(O	TLP383(D4SCYHTLE	TLP383(D4SCYHTLE(T
TLP185(V4YL-TR,E	TLP185(V4YL-TR,E(O	TLP383(D4-TPL,E	TLP383(D4-TPL,E(T
TLP185(V4-Y-TL,E	TLP185(V4-Y-TL,E(O	TLP383(D4-TPR,E	TLP383(D4-TPR,E(T
TLP185(V4Y-TL,SE	TLP185(V4Y-TL,SE(T	TLP383(D4-Y,E	TLP383(D4-Y,E(T
TLP185(V4-Y-TR,E	TLP185(V4-Y-TR,E(O	TLP383(D4-YH,E	TLP383(D4-YH,E(T
TLP185(V4Y-TR,SE	TLP185(V4Y-TR,SE(T	TLP383(D4YH-TL,E	TLP383(D4YH-TL,E(T
TLP185(VMBBLTLSE	TLP185(VMBBLTLSE(T	TLP383(D4YH-TR,E	TLP383(D4YH-TR,E(T
TLP185(VMBGLTLSE	TLP185(VMBGLTLSE(T	TLP383(D4Y-TL,E	TLP383(D4Y-TL,E(T
TLP185(VMBGRTLSE	TLP185(VMBGRTLSE(T	TLP383(D4Y-TR,E	TLP383(D4Y-TR,E(T
TLP185(Y,E	TLP185(Y,E(O	TLP383(E	TLP383(E(T
TLP185(Y,SE	TLP185(Y,SE(O	TLP383(FUGBLTL,E	TLP383(FUGBLTL,E(T
TLP185(Y,SE	TLP185(Y,SE(T	TLP383(GB,E	TLP383(GB,E(T
TLP185(YH,E	TLP185(YH,E(O	TLP383(GB-TPL,E	TLP383(GB-TPL,E(T
TLP185(YH,SE	TLP185(YH,SE(T	TLP383(GB-TPR,E	TLP383(GB-TPR,E(T
TLP185(YH-TPL,E	TLP185(YH-TPL,E(O	TLP383(GR,E	TLP383(GR,E(T
TLP185(YH-TPL,SE	TLP185(YH-TPL,SE(T	TLP383(GRH,E	TLP383(GRH,E(T
TLP185(YH-TPR,E	TLP185(YH-TPR,E(O	TLP383(GRH-TPL,E	TLP383(GRH-TPL,E(T
TLP185(YH-TPR,SE	TLP185(YH-TPR,SE(T	TLP383(GRH-TPR,E	TLP383(GRH-TPR,E(T
TLP185(YL,E	TLP185(YL,E(O	TLP383(GRL,E	TLP383(GRL,E(T
TLP185(YL,SE	TLP185(YL,SE(T	TLP383(GRL-TPL,E	TLP383(GRL-TPL,E(T
TLP185(YL-TPL,E	TLP185(YL-TPL,E(O	TLP383(GRL-TPR,E	TLP383(GRL-TPR,E(T
TLP185(YL-TPL,SE	TLP185(YL-TPL,SE(T	TLP383(GR-TPL,E	TLP383(GR-TPL,E(T
TLP185(YL-TPR,E	TLP185(YL-TPR,E(O	TLP383(GR-TPR,E	TLP383(GR-TPR,E(T
TLP185(YL-TPR,SE	TLP185(YL-TPR,SE(T	TLP383(MBDBLLTLE	TLP383(MBDBLLTLE(T

TLP185(Y-TPL,E	TLP185(Y-TPL,E(O	TLP383(TPL,E	TLP383(TPL,E(T
TLP185(Y-TPL,SE	TLP185(Y-TPL,SE(O	TLP383(TPR,E	TLP383(TPR,E(T
TLP185(Y-TPL,SE	TLP185(Y-TPL,SE(T	TLP383(Y,E	TLP383(Y,E(T
TLP185(Y-TPR,E	TLP185(Y-TPR,E(O	TLP383(YH,E	TLP383(YH,E(T
TLP185(Y-TPR,SE	TLP185(Y-TPR,SE(T	TLP383(YH-TPL,E	TLP383(YH-TPL,E(T
TLP290(4DLGLTRSE	TLP290(4DLGLTRSE(T	TLP383(YH-TPR,E	TLP383(YH-TPR,E(T
TLP290(4MBBLTPSE	TLP290(4MBBLTPSE(T	TLP383(Y-TPL,E	TLP383(Y-TPL,E(T
TLP290(4MBGBTPSE	TLP290(4MBGBTPSE(T	TLP383(Y-TPR,E	TLP383(Y-TPR,E(T
TLP290(BL,SE	TLP290(BL,SE(T	TLP385(4ART1TR,E	TLP385(4ART1TR,E(T
TLP290(BLL,E	TLP290(BLL,E(O	TLP385(4ART2TR,E	TLP385(4ART2TR,E(T
TLP290(BLL,E	TLP290(BLL,E(T	TLP385(4KWJBLTLE	TLP385(4KWJBLTLE(T
TLP290(BLL,SE	TLP290(BLL,SE(T	TLP385(4MBDGHTLE	TLP385(4MBDGHTLE(T
TLP290(BLL-TP,E	TLP290(BLL-TP,E(O	TLP385(4MBGLTL,E	TLP385(4MBGLTL,E(T
TLP290(BLL-TP,E	TLP290(BLL-TP,E(T	TLP385(4MBGRTL,E	TLP385(4MBGRTL,E(T
TLP290(BLL-TP,SE	TLP290(BLL-TP,SE(O	TLP385(4PLBLTL,E	TLP385(4PLBLTL,E(T
TLP290(BLL-TP,SE	TLP290(BLL-TP,SE(T	TLP385(4PLIYHTLE	TLP385(4PLIYHTLE(T
TLP290(BL-TP,SE	TLP290(BL-TP,SE(T	TLP385(4SEMCBTLE	TLP385(4SEMCBTLE(T
TLP290(DAIGBTPSE	TLP290(DAIGBTPSE(T	TLP385(4TELGBTLE	TLP385(4TELGBTLE(T
TLP290(E	TLP290(E(O	TLP385(BL,E	TLP385(BL,E(T
TLP290(E	TLP290(E(T	TLP385(BLL,E	TLP385(BLL,E(T
TLP290(GB,E	TLP290(GB,E(O	TLP385(BLL-TPL,E	TLP385(BLL-TPL,E(T
TLP290(GB,E	TLP290(GB,E(T	TLP385(BLL-TPR,E	TLP385(BLL-TPR,E(T
TLP290(GB,SE	TLP290(GB,SE(T	TLP385(BL-TPL,E	TLP385(BL-TPL,E(T
TLP290(GB-TP,E	TLP290(GB-TP,E(O	TLP385(BL-TPR,E	TLP385(BL-TPR,E(T
TLP290(GB-TP,E	TLP290(GB-TP,E(T	TLP385(BRZ-GR,E	TLP385(BRZ-GR,E(T
TLP290(GB-TP,SE	TLP290(GB-TP,SE(O	TLP385(BRZGRTL,E	TLP385(BRZGRTL,E(T
TLP290(GB-TP,SE	TLP290(GB-TP,SE(T	TLP385(D4,E	TLP385(D4,E(T
TLP290(GR,E	TLP290(GR,E(O	TLP385(D4-BL,E	TLP385(D4-BL,E(T
TLP290(GR,E	TLP290(GR,E(T	TLP385(D4-BLL,E	TLP385(D4-BLL,E(T
TLP290(GR,SE	TLP290(GR,SE(T	TLP385(D4BLLTL,E	TLP385(D4BLLTL,E(T
TLP290(GR-TP,E	TLP290(GR-TP,E(O	TLP385(D4BLLTR,E	TLP385(D4BLLTR,E(T
TLP290(GR-TP,E	TLP290(GR-TP,E(T	TLP385(D4BL-TL,E	TLP385(D4BL-TL,E(T
TLP290(GR-TP,SE	TLP290(GR-TP,SE(O	TLP385(D4BL-TR,E	TLP385(D4BL-TR,E(T
TLP290(GR-TP,SE	TLP290(GR-TP,SE(T	TLP385(D4CHIBTRE	TLP385(D4CHIBTRE(T
TLP290(GRTPPP,SE	TLP290(GRTPPP,SE(T	TLP385(D4CHITR,E	TLP385(D4CHITR,E(T
TLP290(KWJGBTPSE	TLP290(KWJGBTPSE(T	TLP385(D4-GB,E	TLP385(D4-GB,E(O
TLP290(LUTGBTR,E	TLP290(LUTGBTR,E(O	TLP385(D4-GB,E	TLP385(D4-GB,E(T
TLP290(MBDBLTPSE	TLP290(MBDBLTPSE(T	TLP385(D4GB-TL,E	TLP385(D4GB-TL,E(O
TLP290(MBDGBTPSE	TLP290(MBDGBTPSE(T	TLP385(D4GB-TL,E	TLP385(D4GB-TL,E(T
TLP290(MBGBTP,SE	TLP290(MBGBTP,SE(O	TLP385(D4GB-TR,E	TLP385(D4GB-TR,E(O
TLP290(MBGBTP,SE	TLP290(MBGBTP,SE(T	TLP385(D4GB-TR,E	TLP385(D4GB-TR,E(T
TLP290(MBGRTP,SE	TLP290(MBGRTP,SE(O	TLP385(D4GH-TL,E	TLP385(D4GH-TL,E(T
TLP290(MBGRTP,SE	TLP290(MBGRTP,SE(T	TLP385(D4GH-TR,E	TLP385(D4GH-TR,E(T
TLP290(SE	TLP290(SE(T	TLP385(D4GL-TL,E	TLP385(D4GL-TL,E(T
TLP290(TOKUDN,SE	TLP290(TOKUDN,SE(T	TLP385(D4GL-TR,E	TLP385(D4GL-TR,E(T
TLP290(TP,E	TLP290(TP,E(O	TLP385(D4-GR,E	TLP385(D4-GR,E(T
TLP290(TP,E	TLP290(TP,E(T	TLP385(D4GREETRE	TLP385(D4GREETRE(O

TLP290(TP,SE	TLP290(TP,SE(T	TLP385(D4GREETRE	TLP385(D4GREETRE(T
TLP290(TSIJ-TP,E	TLP290(TSIJ-TP,E(O	TLP385(D4-GRH,E	TLP385(D4-GRH,E(T
TLP290(UG-TPR,E	TLP290(UG-TPR,E(O	TLP385(D4-GRL,E	TLP385(D4-GRL,E(T
TLP290(UG-TPR,SE	TLP290(UG-TPR,SE(T	TLP385(D4GR-TL,E	TLP385(D4GR-TL,E(T
TLP290(V4,E	TLP290(V4,E(O	TLP385(D4GR-TR,E	TLP385(D4GR-TR,E(O
TLP290(V4,E	TLP290(V4,E(T	TLP385(D4GR-TR,E	TLP385(D4GR-TR,E(T
TLP290(V4,SE	TLP290(V4,SE(T	TLP385(D4MBBTL,E	TLP385(D4MBBTL,E(T
TLP290(V4-BL,SE	TLP290(V4-BL,SE(T	TLP385(D4MBSGR,E	TLP385(D4MBSGR,E(T
TLP290(V4-BLL,E	TLP290(V4-BLL,E(O	TLP385(D4SCGRTRE	TLP385(D4SCGRTRE(T
TLP290(V4-BLL,E	TLP290(V4-BLL,E(T	TLP385(D4TELBTL,E	TLP385(D4TELBTL,E(T
TLP290(V4-BLL,SE	TLP290(V4-BLL,SE(T	TLP385(D4-TPL,E	TLP385(D4-TPL,E(T
TLP290(V4BLTP,SE	TLP290(V4BLTP,SE(T	TLP385(D4-TPR,E	TLP385(D4-TPR,E(T
TLP290(V4B-TP,E	TLP290(V4B-TP,E(O	TLP385(D4-Y,E	TLP385(D4-Y,E(T
TLP290(V4B-TP,E	TLP290(V4B-TP,E(T	TLP385(D4-YH,E	TLP385(D4-YH,E(T
TLP290(V4B-TP,SE	TLP290(V4B-TP,SE(T	TLP385(D4YH-TL,E	TLP385(D4YH-TL,E(T
TLP290(V4-GB,E	TLP290(V4-GB,E(O	TLP385(D4YH-TR,E	TLP385(D4YH-TR,E(T
TLP290(V4-GB,E	TLP290(V4-GB,E(T	TLP385(D4Y-TPL,E	TLP385(D4Y-TPL,E(T
TLP290(V4-GB,SE	TLP290(V4-GB,SE(T	TLP385(D4Y-TPR,E	TLP385(D4Y-TPR,E(T
TLP290(V4GB-TP,E	TLP290(V4GB-TP,E(O	TLP385(E	TLP385(E(T
TLP290(V4GB-TP,E	TLP290(V4GB-TP,E(T	TLP385(GB,E	TLP385(GB,E(T
TLP290(V4GBTP,SE	TLP290(V4GBTP,SE(O	TLP385(GB-PP,E	TLP385(GB-PP,E(T
TLP290(V4GBTP,SE	TLP290(V4GBTP,SE(T	TLP385(GBTL-PP,E	TLP385(GBTL-PP,E(T
TLP290(V4-GR,E	TLP290(V4-GR,E(O	TLP385(GB-TPL,E	TLP385(GB-TPL,E(T
TLP290(V4-GR,E	TLP290(V4-GR,E(T	TLP385(GB-TPR,E	TLP385(GB-TPR,E(T
TLP290(V4-GR,SE	TLP290(V4-GR,SE(T	TLP385(GR,E	TLP385(GR,E(T
TLP290(V4GR-TP,E	TLP290(V4GR-TP,E(O	TLP385(GRH,E	TLP385(GRH,E(T
TLP290(V4GR-TP,E	TLP290(V4GR-TP,E(T	TLP385(GRH-TPL,E	TLP385(GRH-TPL,E(T
TLP290(V4GRTP,SE	TLP290(V4GRTP,SE(O	TLP385(GRH-TPR,E	TLP385(GRH-TPR,E(T
TLP290(V4GRTP,SE	TLP290(V4GRTP,SE(T	TLP385(GRL,E	TLP385(GRL,E(T
TLP290(V4GR-TR,E	TLP290(V4GR-TR,E(O	TLP385(GRL-TPL,E	TLP385(GRL-TPL,E(T
TLP290(V4GR-TR,E	TLP290(V4GR-TR,E(T	TLP385(GRL-TPR,E	TLP385(GRL-TPR,E(T
TLP290(V4GRTR,SE	TLP290(V4GRTR,SE(T	TLP385(GR-PP,E	TLP385(GR-PP,E(T
TLP290(V4-TP,E	TLP290(V4-TP,E(O	TLP385(GRTL-PP,E	TLP385(GRTL-PP,E(T
TLP290(V4-TP,E	TLP290(V4-TP,E(T	TLP385(GR-TPL,E	TLP385(GR-TPL,E(T
TLP290(V4-TP,SE	TLP290(V4-TP,SE(T	TLP385(GR-TPR,E	TLP385(GR-TPR,E(T
TLP290(V4-Y,E	TLP290(V4-Y,E(O	TLP385(HKKGBTLE,E	TLP385(HKKGBTLE,E(T
TLP290(V4-Y,E	TLP290(V4-Y,E(T	TLP385(KET-TPL,E	TLP385(KET-TPL,E(T
TLP290(V4-Y,SE	TLP290(V4-Y,SE(T	TLP385(TPL,E	TLP385(TPL,E(T
TLP290(V4-Y-TP,E	TLP290(V4-Y-TP,E(O	TLP385(TPR,E	TLP385(TPR,E(T
TLP290(V4-Y-TP,E	TLP290(V4-Y-TP,E(T	TLP385(Y,E	TLP385(Y,E(T
TLP290(V4Y-TP,SE	TLP290(V4Y-TP,SE(T	TLP385(YH,E	TLP385(YH,E(T
TLP290(Y,E	TLP290(Y,E(O	TLP385(YH-TPL,E	TLP385(YH-TPL,E(T
TLP290(Y,E	TLP290(Y,E(T	TLP385(YH-TPR,E	TLP385(YH-TPR,E(T
TLP290(Y,SE	TLP290(Y,SE(T	TLP385(Y-TPL,E	TLP385(Y-TPL,E(O
TLP290(Y-TP,E	TLP290(Y-TP,E(O	TLP385(Y-TPL,E	TLP385(Y-TPL,E(T
TLP290(Y-TP,E	TLP290(Y-TP,E(T	TLP385(Y-TPR,E	TLP385(Y-TPR,E(T
TLP290(Y-TP,SE	TLP290(Y-TP,SE(T	TLP620M(BL,E	TLP620M(BL,E(O

TLP290-4(E	TLP290-4(E(T	TLP620M(BL-LF1,E	TLP620M(BL-LF1,E(O
TLP290-4(GB,E	TLP290-4(GB,E(T	TLP620M(BL-LF5,E	TLP620M(BL-LF5,E(O
TLP290-4(GB-TP,E	TLP290-4(GB-TP,E(T	TLP620M(BL-TP1,E	TLP620M(BL-TP1,E(O
TLP290-4(MBGBTPE	TLP290-4(MBGBTPE(T	TLP620M(BL-TP5,E	TLP620M(BL-TP5,E(O
TLP290-4(TP,E	TLP290-4(TP,E(T	TLP620M(D4,E	TLP620M(D4,E(O
TLP290-4(UG-TP,E	TLP290-4(UG-TP,E(T	TLP620M(D4-BL,E	TLP620M(D4-BL,E(O
TLP290-4(V4,E	TLP290-4(V4,E(O	TLP620M(D4BLF1,E	TLP620M(D4BLF1,E(O
TLP290-4(V4,E	TLP290-4(V4,E(T	TLP620M(D4BLF5,E	TLP620M(D4BLF5,E(O
TLP290-4(V4-GB,E	TLP290-4(V4-GB,E(O	TLP620M(D4BLT1,E	TLP620M(D4BLT1,E(O
TLP290-4(V4-GB,E	TLP290-4(V4-GB,E(T	TLP620M(D4BLT5,E	TLP620M(D4BLT5,E(O
TLP290-4(V4GBTPE	TLP290-4(V4GBTPE(O	TLP620M(D4-GB,E	TLP620M(D4-GB,E(O
TLP290-4(V4GBTPE	TLP290-4(V4GBTPE(T	TLP620M(D4GBF1,E	TLP620M(D4GBF1,E(O
TLP290-4(V4-TP,E	TLP290-4(V4-TP,E(O	TLP620M(D4GBF5,E	TLP620M(D4GBF5,E(O
TLP290-4(V4-TP,E	TLP290-4(V4-TP,E(T	TLP620M(D4GBT1,E	TLP620M(D4GBT1,E(O
TLP290-4(VMBGBLE	TLP290-4(VMBGBLE(T	TLP620M(D4GBT5,E	TLP620M(D4GBT5,E(O
TLP291(4ART1TPSE	TLP291(4ART1TPSE(T	TLP620M(D4-GR,E	TLP620M(D4-GR,E(O
TLP291(4ART1TRSE	TLP291(4ART1TRSE(T	TLP620M(D4GRF1,E	TLP620M(D4GRF1,E(O
TLP291(4ART2TPSE	TLP291(4ART2TPSE(T	TLP620M(D4GRF5,E	TLP620M(D4GRF5,E(O
TLP291(BL,SE	TLP291(BL,SE(T	TLP620M(D4GRT1,E	TLP620M(D4GRT1,E(O
TLP291(BLL,E	TLP291(BLL,E(O	TLP620M(D4GRT5,E	TLP620M(D4GRT5,E(O
TLP291(BLL,E	TLP291(BLL,E(T	TLP620M(D4-LF1,E	TLP620M(D4-LF1,E(O
TLP291(BLL,SE	TLP291(BLL,SE(T	TLP620M(D4-LF5,E	TLP620M(D4-LF5,E(O
TLP291(BLL-TP,E	TLP291(BLL-TP,E(O	TLP620M(D4-TP1,E	TLP620M(D4-TP1,E(O
TLP291(BLL-TP,E	TLP291(BLL-TP,E(T	TLP620M(D4-TP5,E	TLP620M(D4-TP5,E(O
TLP291(BLL-TP,SE	TLP291(BLL-TP,SE(T	TLP620M(D4-Y,E	TLP620M(D4-Y,E(O
TLP291(BLL-TR,SE	TLP291(BLL-TR,SE(T	TLP620M(D4Y-F1,E	TLP620M(D4Y-F1,E(O
TLP291(BL-TP,SE	TLP291(BL-TP,SE(T	TLP620M(D4Y-F5,E	TLP620M(D4Y-F5,E(O
TLP291(BL-TPR,SE	TLP291(BL-TPR,SE(T	TLP620M(D4Y-T1,E	TLP620M(D4Y-T1,E(O
TLP291(BRZ-GR,SE	TLP291(BRZ-GR,SE(T	TLP620M(D4Y-T5,E	TLP620M(D4Y-T5,E(O
TLP291(BRZGRTPSE	TLP291(BRZGRTPSE(T	TLP620M(E	TLP620M(E(O
TLP291(DENGBTPSE	TLP291(DENGBTPSE(T	TLP620M(GB,E	TLP620M(GB,E(O
TLP291(E	TLP291(E(O	TLP620M(GB-LF1,E	TLP620M(GB-LF1,E(O
TLP291(E	TLP291(E(T	TLP620M(GB-LF5,E	TLP620M(GB-LF5,E(O
TLP291(GB,E	TLP291(GB,E(O	TLP620M(GB-TP1,E	TLP620M(GB-TP1,E(O
TLP291(GB,E	TLP291(GB,E(T	TLP620M(GB-TP5,E	TLP620M(GB-TP5,E(O
TLP291(GB,SE	TLP291(GB,SE(T	TLP620M(GR,E	TLP620M(GR,E(O
TLP291(GB-TP,E	TLP291(GB-TP,E(O	TLP620M(GR-LF1,E	TLP620M(GR-LF1,E(O
TLP291(GB-TP,E	TLP291(GB-TP,E(T	TLP620M(GR-LF5,E	TLP620M(GR-LF5,E(O
TLP291(GB-TP,SE	TLP291(GB-TP,SE(O	TLP620M(GR-TP1,E	TLP620M(GR-TP1,E(O
TLP291(GB-TP,SE	TLP291(GB-TP,SE(T	TLP620M(GR-TP5,E	TLP620M(GR-TP5,E(O
TLP291(GBTP-PP,E	TLP291(GBTP-PP,E(O	TLP620M(LF1,E	TLP620M(LF1,E(O
TLP291(GBTPPP,SE	TLP291(GBTPPP,SE(T	TLP620M(LF5,E	TLP620M(LF5,E(O
TLP291(GB-TPR,SE	TLP291(GB-TPR,SE(O	TLP620M(TP1,E	TLP620M(TP1,E(O
TLP291(GB-TPR,SE	TLP291(GB-TPR,SE(T	TLP620M(TP5,E	TLP620M(TP5,E(O
TLP291(GR,E	TLP291(GR,E(O	TLP620M(Y,E	TLP620M(Y,E(O
TLP291(GR,E	TLP291(GR,E(T	TLP620M(Y-LF1,E	TLP620M(Y-LF1,E(O
TLP291(GR,SE	TLP291(GR,SE(T	TLP620M(Y-LF5,E	TLP620M(Y-LF5,E(O

TLP291(GRH,E	TLP291(GRH,E(O	TLP620M(Y-TP1,E	TLP620M(Y-TP1,E(O
TLP291(GRH,SE	TLP291(GRH,SE(T	TLP620M(Y-TP5,E	TLP620M(Y-TP5,E(O
TLP291(GRH-TP,E	TLP291(GRH-TP,E(O	TLP620MF(4MB1T4E	TLP620MF(4MB1T4E(O
TLP291(GRH-TP,SE	TLP291(GRH-TP,SE(T	TLP620MF(4MGRT4E	TLP620MF(4MGRT4E(O
TLP291(GRH-TR,SE	TLP291(GRH-TR,SE(T	TLP620MF(BL,E	TLP620MF(BL,E(O
TLP291(GRL,E	TLP291(GRL,E(O	TLP620MF(BL-F4,E	TLP620MF(BL-F4,E(O
TLP291(GRL,E	TLP291(GRL,E(T	TLP620MF(BL-T4,E	TLP620MF(BL-T4,E(O
TLP291(GRL,SE	TLP291(GRL,SE(T	TLP620MF(D4,E	TLP620MF(D4,E(O
TLP291(GRL-TP,E	TLP291(GRL-TP,E(O	TLP620MF(D4-BL,E	TLP620MF(D4-BL,E(O
TLP291(GRL-TP,SE	TLP291(GRL-TP,SE(T	TLP620MF(D4BLF4E	TLP620MF(D4BLF4E(O
TLP291(GRL-TR,SE	TLP291(GRL-TR,SE(T	TLP620MF(D4BLT4E	TLP620MF(D4BLT4E(O
TLP291(GR-TP,E	TLP291(GR-TP,E(O	TLP620MF(D4-F4,E	TLP620MF(D4-F4,E(O
TLP291(GR-TP,E	TLP291(GR-TP,E(T	TLP620MF(D4-GB,E	TLP620MF(D4-GB,E(O
TLP291(GR-TP,SE	TLP291(GR-TP,SE(T	TLP620MF(D4GBF4E	TLP620MF(D4GBF4E(O
TLP291(GR-TPR,SE	TLP291(GR-TPR,SE(T	TLP620MF(D4GBT4E	TLP620MF(D4GBT4E(O
TLP291(HSS1TP,SE	TLP291(HSS1TP,SE(T	TLP620MF(D4-GR,E	TLP620MF(D4-GR,E(O
TLP291(KGES,SE	TLP291(KGES,SE(T	TLP620MF(D4GRF4E	TLP620MF(D4GRF4E(O
TLP291(MBLLTPSE	TLP291(MBLLTPSE(T	TLP620MF(D4GRT4E	TLP620MF(D4GRT4E(O
TLP291(MBBLTP,SE	TLP291(MBBLTP,SE(T	TLP620MF(D4-T4,E	TLP620MF(D4-T4,E(O
TLP291(MBGBTP,SE	TLP291(MBGBTP,SE(T	TLP620MF(D4-Y,E	TLP620MF(D4-Y,E(O
TLP291(MBGRTP,SE	TLP291(MBGRTP,SE(T	TLP620MF(D4YF4,E	TLP620MF(D4YF4,E(O
TLP620MF(GR-F4,E	TLP620MF(GR-F4,E(O	TLP620MF(D4YT4,E	TLP620MF(D4YT4,E(O
TLP620MF(GR-T4,E	TLP620MF(GR-T4,E(O	TLP620MF(E	TLP620MF(E(O
TLP620MF(LF4,E	TLP620MF(LF4,E(O	TLP620MF(GB,E	TLP620MF(GB,E(O
TLP620MF(MB1T4,E	TLP620MF(MB1T4,E(O	TLP620MF(GB-F4,E	TLP620MF(GB-F4,E(O
TLP620MF(MBGRT4E	TLP620MF(MBGRT4E(O	TLP620MF(GB-T4,E	TLP620MF(GB-T4,E(O
TLP620MF(TP4,E	TLP620MF(TP4,E(O	TLP620MF(GR,E	TLP620MF(GR,E(O
TLP620MF(Y,E	TLP620MF(Y,E(O	TLP620MF(Y-TP4,E	TLP620MF(Y-TP4,E(O
TLP620MF(Y-LF4,E	TLP620MF(Y-LF4,E(O		

Change Notice for Toshiba Product

Change of photo detecting chip for General-use Tr Coupler

TOSHIBA

Toshiba Electronic Devices & Storage Corporation

August 28, 2020

Background and affected product

① **Description of the change** : Consolidate a few kinds of photo detecting transistor chips

② **Purpose of the change** : Reduce the control steps by consolidating chips

③ **Affected product** : All General-use Double Molded Coupler introducing photo detecting transistor chips

■ **Affected product** (Photo detecting transistor chip for Photo coupler)

Affected series	Affected product	Description of the change
TLP185(E), TLP184(E), TLP290(E) TLP290-4(E), TLP291(E), TLP291-4(E) TLP385(E), TLP620M(E)	Refer to the attachment for the details	Consolidate photo detecting Tr chips
TLP293(E), TLP182(E), TLP183(E) TLP292(E), TLP292-4(E), TLP293-4(E) TLP383(E)		

Change point in the process

Main change in the consolidation of Tr chips

5M1E		(Kaga)Manufacturing line	
		Before change	After change
Design / Pattern		–	With EQR
Man(人)		No change	
Machine(装置)		No change	
Material (原材料)		No change	
Method (方法)		No change	
Measurement (測定)		No change	
Environment (環境)	Cleanliness level	No change	
	System	No change	

QC Process Chart (Photo-Tr)

Before change

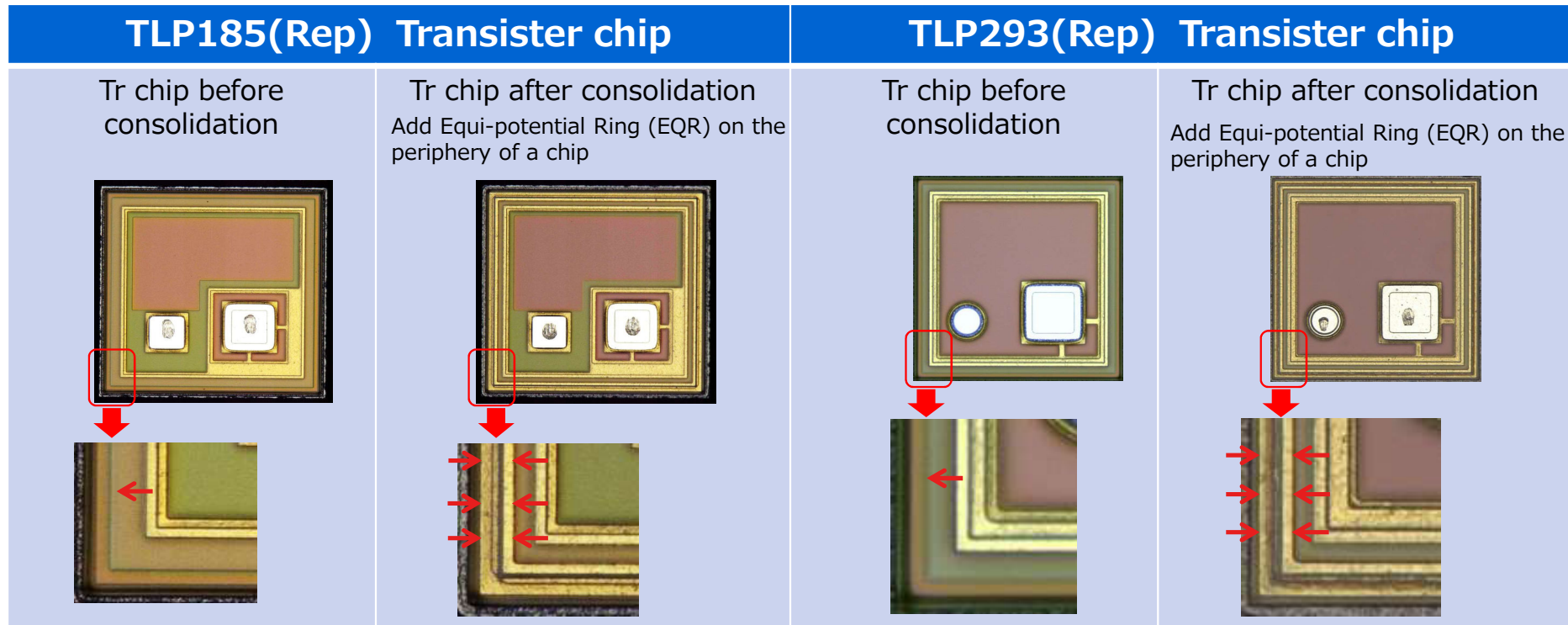
製造工程		管理項目	管理頻度
フローチャート	工程名		
▽	ウェーハ受入		
○	酸化	膜厚	1回/チャージ
○	ベース形成	温度	常時モニタ
○	エミッタ形成	温度	常時モニタ
○	コンタクト開孔	外観	1回/ロット
○	メタル形成	膜厚	1回/ロット
○	パッシベーション形成	外観	1回/ロット
□	特性検査	電気的特性	
○	ラッピング	ウェーハ厚	1回/ロット
○	裏面メタル形成		
○	ダイシング		
□	外観検査		
▽	出荷		
<small>工程図記号</small> ▽: 貯蔵 ○: 加工 □: 全数検査 ◻: 抜取検査 ◻Δ: 特殊検査 ○—□: チェック			

After change

製造工程		管理項目	管理頻度
フローチャート	工程名		
▽	ウェーハ受入		
○	酸化	膜厚	1回/チャージ
○	ベース形成	温度	常時モニタ
○	エミッタ形成	温度	常時モニタ
○	コンタクト開孔	外観	1回/ロット
○	メタル形成	膜厚	1回/ロット
○	パッシベーション形成	外観	1回/ロット
□	特性検査	電気的特性	
○	ラッピング	ウェーハ厚	1回/ロット
○	裏面メタル形成		
○	ダイシング		
□	外観検査		
▽	出荷		
<small>工程図記号</small> ▽: 貯蔵 ○: 加工 □: 全数検査 ◻: 抜取検査 ◻Δ: 特殊検査 ○—□: チェック			

No change is planned in the QC Process Chart.

Change Point : Transister chip with EQR



After the consolidation, transister chip will adopt the Al pattern with Equi-potential ring on the chip periphery. No difference is expected in the chip size, basic design, and characteristics.

Consequently, no change point will arise in the characteristics and reliability has a photo coupler.

Product using the same chip as TLP185 : TLP184/TLP290/TLP290-4/TLP291/TP291-4/TLP385/TLP620M

Product using the same chip as TLP293 : TLP182/TLP183/TLP292/TLP292-4/TLP293-4/TLP383

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Product evaluation

1) Characteristics test

- Comparison of the electrical characteristics

* Since the change point exists in the photo detector side, the photo detecting and coupling characteristics were compared.

2) Electrostatic discharge resistance

- ESD

3) Reliability test

- Selected TLP185/TLP293 as the representative, and conducted the tests.

No.	Test item	Test condition	Test time	Quantity
1	High temperature continuous operation	Ta=85°C, Voltage/Current = Operation Max	1000 h	60
2	High temperature storage	Ta=125°C	1000 h	60
3	High temperature, High humidity biased	Ta=85°C, RH=85%, Voltage= Operation Max	1000 h	60
4	Pressure cooker	Ta=121°C, 0.203MPa(No-condensation)	96 h	60
5	Temperature cycling	-55°C(30min)~125°C(30min)	300 cycle	60

* Pre-treatment (saturated absorption + reflow) was conducted for all test items

4) Process verification

- Process capability (element characteristics item)

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Initial characteristics distribution (Process capability)

Before change n=50

After change n=50

TLP185

Initial characteristics data : Standard condition

@Ta=25(°C)

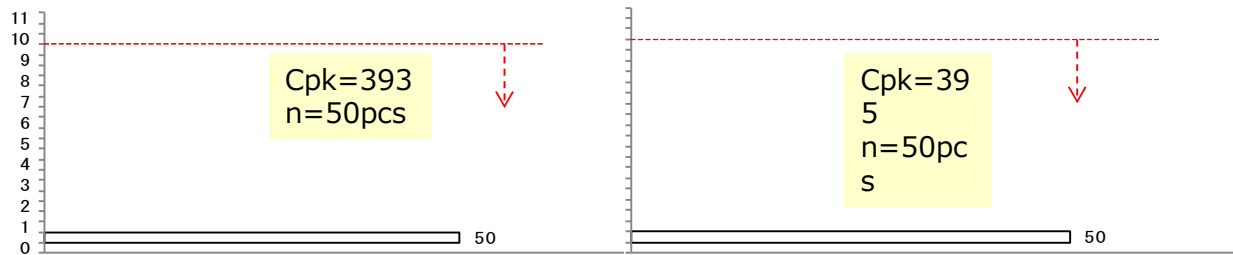
Item	Test condition	Specification (TD)				Before change		After change	
		Min.	Typ.	Max.	Unit	Ave.	Cpk	Ave.	Cpk
IR	VR=5V	–	–	10	μA	0.01	393	0.01	395
VF	IF=10mA	1.1	1.25	1.4	V	1.22	35.8	1.22	48.0
VCEO	IC=0.5mA	80	–	–	V	149	49.1	144	52.3
VECO	IE=0.1mA	7	–	–	V	9.77	31.4	9.90	36.8
Iceo	VCE=48V	–	0.01	0.08	μA	0.01	3.54	0.01	3.57
IC/IF(1)	IF=5mA VCE=5V	50	–	400	%	314	2.95	312	5.97
IC/IF(sat)	IF=1mA VCE=0.4V	30	–	–	%	186	8.88	184	17.3
VCE(sat)	IC=2.4mA IF=8mA	–	–	0.3	V	0.133	23.6	0.145	26.4
IC(off)	VF=0.7V VCE=48V	–	1	10	μA	0.03	135	0.02	151

Changed product has sufficient process capability

Initial characteristics distribution

Part No. : TLP185

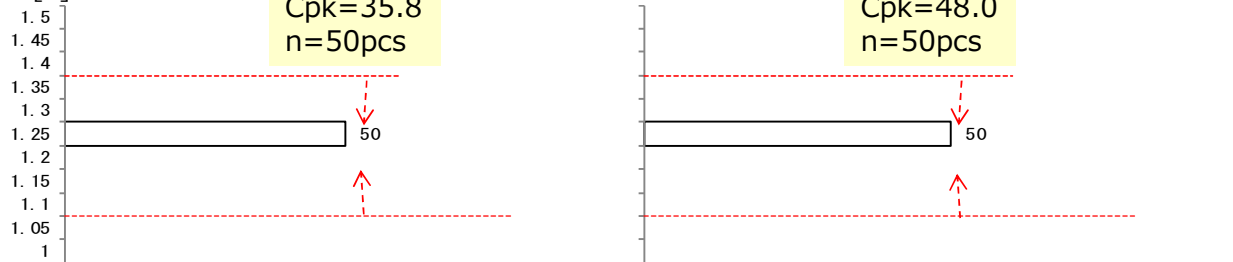
IR [uA] VR=5V



Before change

After change

VF [V] IF=10mA

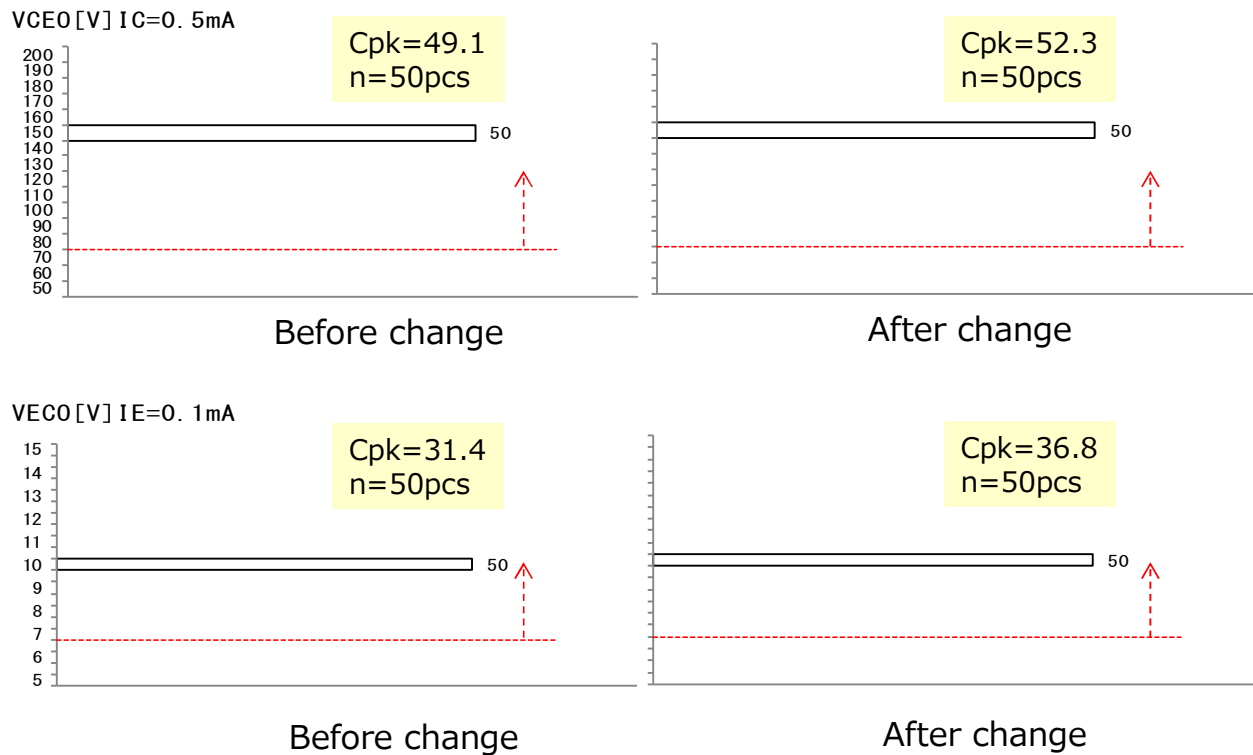


Before change

After change

Initial characteristics distribution

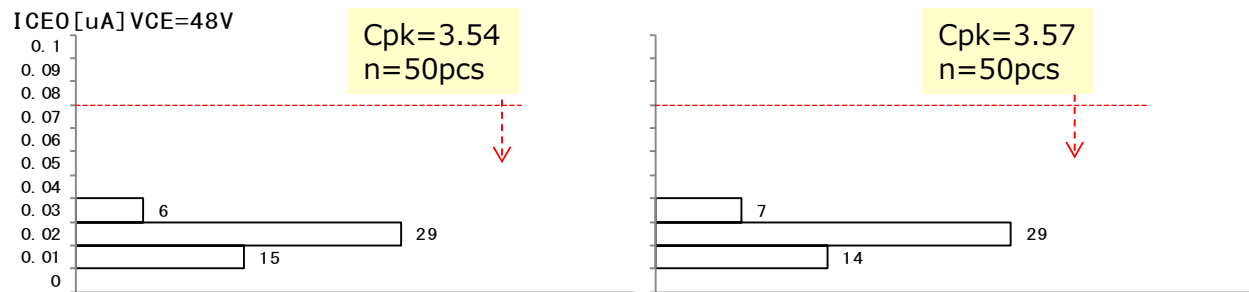
Part No. : TLP185



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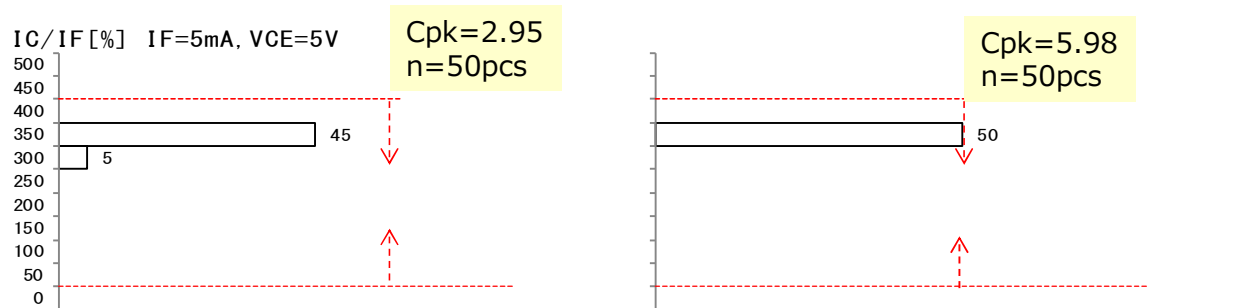
Initial characteristics distribution

Part No. : TLP185



Before change

After change



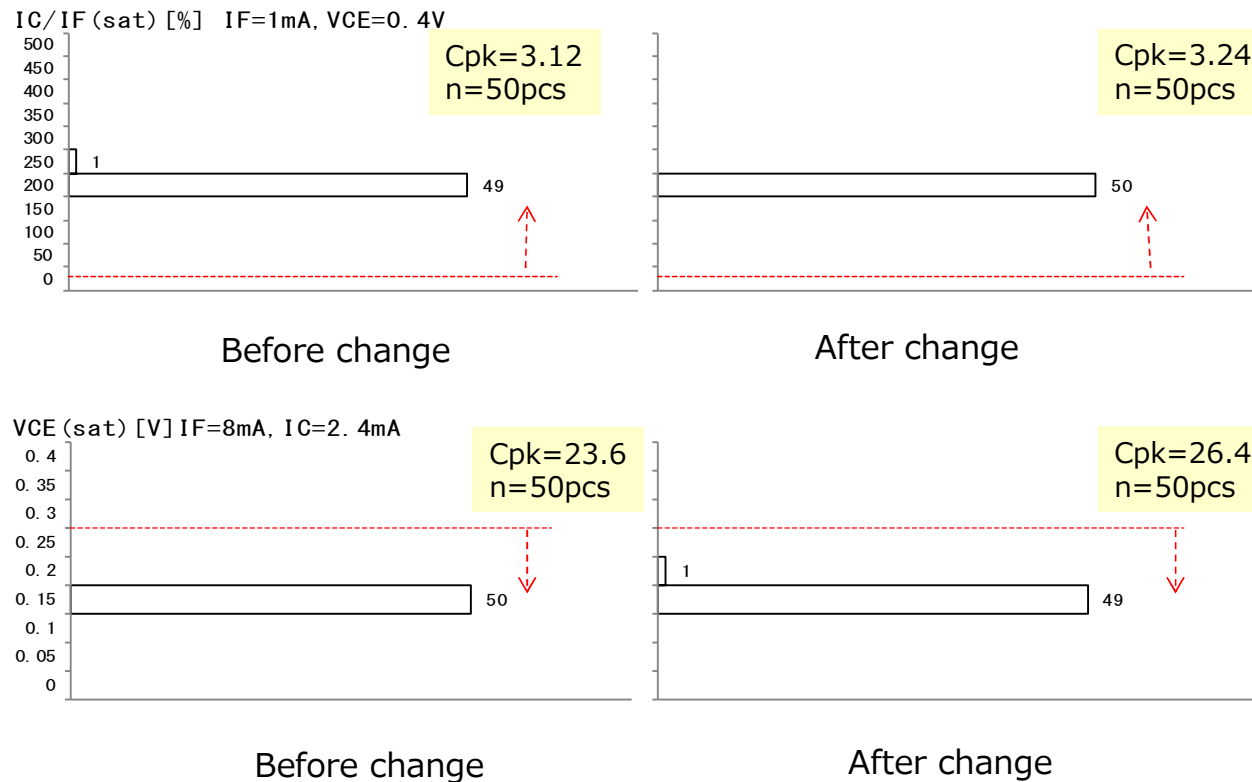
Before change

After change

Confidential

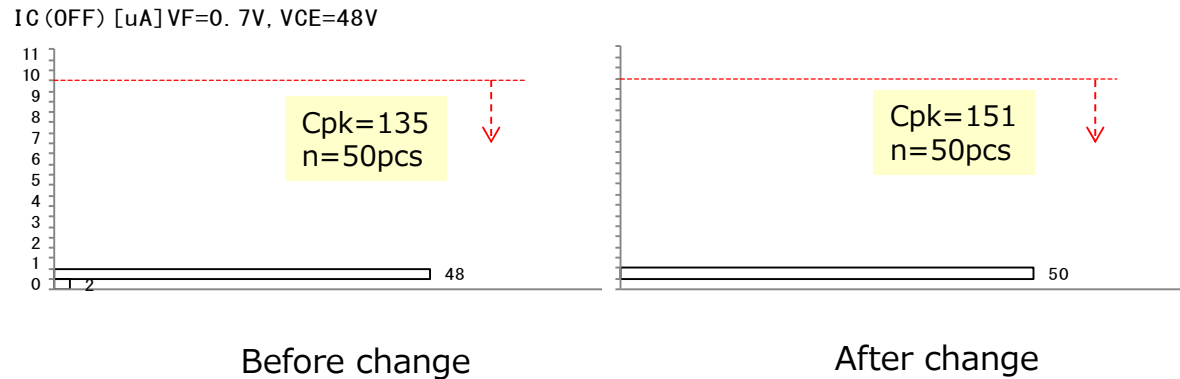
Initial characteristics distribution

Part No. : TLP185



Initial characteristics distribution

Part No. : TLP185



Comparing to the conventional product,
process capability of changed product is equivalent or more.

Application test data (ESD test)

Part No. : TLP185

Test result : Machine mode (MM)

Part No.	Test result($\pm 200V$) : Failed Q'ty / Tested Q'ty	
TLP185	Before change	0/10 pcs
	After change	0/10 pcs

Test condition : C=200pF, R= 0 Ω , Applying once

Changed product demonstrated sufficient performance.

Test result : Human Body Model (HBM)

Part No.	Test result($\pm 2000V$) : Failed Q'ty / Tested Q'ty	
TLP185	Before change	0/10 pcs
	After change	0/10 pcs

Test condition : C= 100pF, R= 1.5 k Ω , Applying once

Changed product demonstrated sufficient performance.

Test result : Charged Device Model (CDM)

Part No.	Test result($\pm 500V$) : Failed Q'ty / Tested Q'ty	
TLP185	Before change	0/10 pcs
	After change	0/10 pcs

JEITA test condition: Applying once

Changed product demonstrated sufficient performance.

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Reliability test result

Part No. : TLP185 (Representative)

No.	Test item	Test condition	Judgement (Failed Q'ty / Tested Q'ty)		
			Test time	Before change	After change
1	Continuous operation	Ta=110°C,IF=20mA,Po=23mW	1000 h	0/60 pcs	0/60 pcs
2	High temperature storage	Ta=125°C	1000 h	0/60 pcs	0/60 pcs
3	High temperature High humidity Continuous operation	Ta=85°C, RH=85%, VCE=80V	1000 h	0/60 pcs	0/60 pcs
4	Pressure cooker	Ta=121°C, 203kPa (No-condensation)	96 h	0/60 pcs	0/60 pcs
5	Temperature cycling	-55°C(30min)~125°C(30min)	300 cycle	0/60 pcs	0/60 pcs

* Pre-treatment (saturated absorption + reflow) was conducted for all test items

No failure occurred in each test item. We therefore conclude that changed product has equivalent level with the conventional product.

Initial characteristics distribution (Process capability)

Before change n=50pcs

After change n=50pcs

TLP293

Initial characteristic data: Standard condition

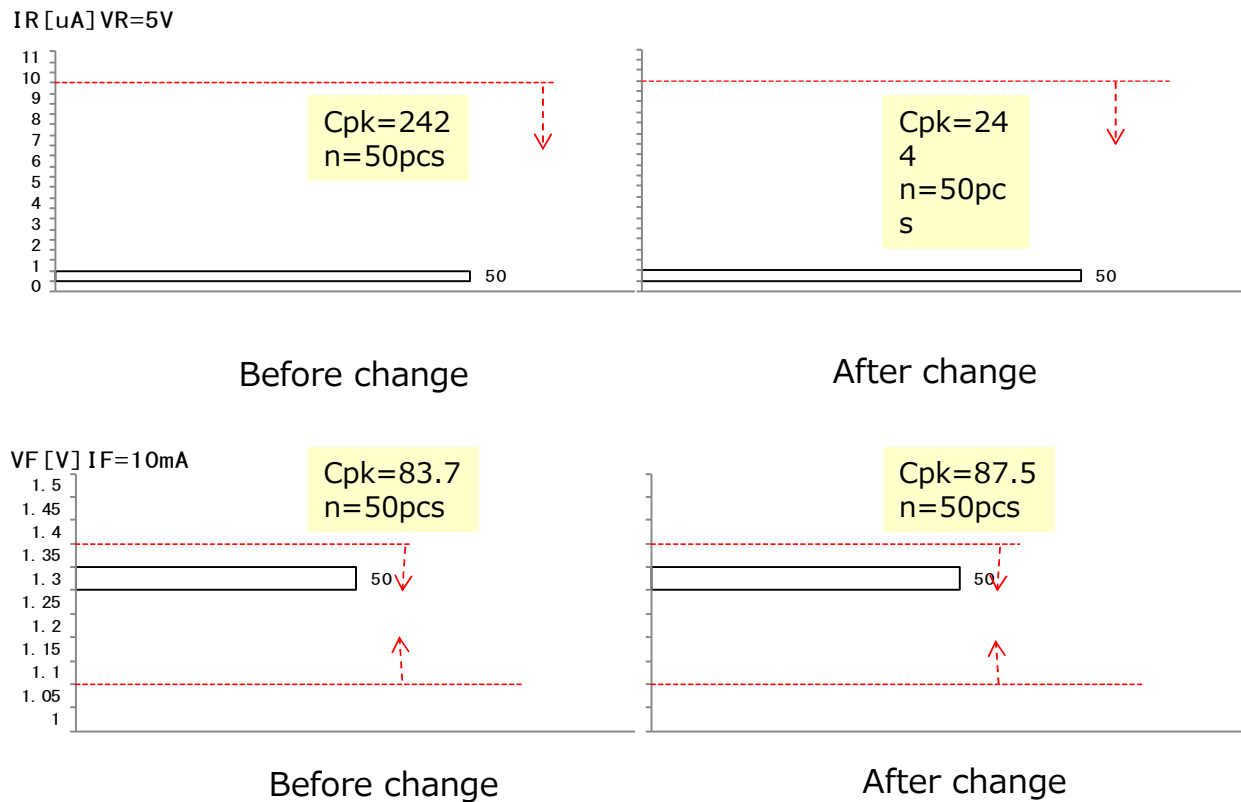
@Ta=25(°C)

Item	Test condition	Specification (TD)				Before change		After change	
		Min.	Typ.	Max.	Unit	Ave.	Cpk	Ave.	Cpk
IR	VR=5V	–	–	10	μA	0.03	242	0.03	244
VF	IF=10mA	1.1	1.25	1.4	V	1.27	63.7	1.28	87.5
VCEO	IC=0.5mA	80	–	–	V	128	37.6	135	38.5
VECO	IE=0.1mA	7	–	–	V	10.0	106	10.0	128
IDARK	VCE=48V	–	0.01	0.08	μA	0.02	3.45	0.01	3.47
IC/IF(1)	IF=5mA VCE=5V	50	–	600	%	259	4.89	230	5.53
IC/IF(2)	IF=0.5mA VCE=5V	50	–	600	%	256	3.12	230	3.24
IC/IF(sat)	IF=1mA VCE=0.4V	30	–	–	%	233	5.54	212	6.02
VCE(sat)	IC=2.4mA IF=8mA	–	–	0.3	V	0.125	25.4	0.13	27.1
IC(off)	VF=0.7V VCE=48V	–	–	10	μA	0.08	135	0.08	145

Changed product has sufficient process capability

Initial characteristics distribution

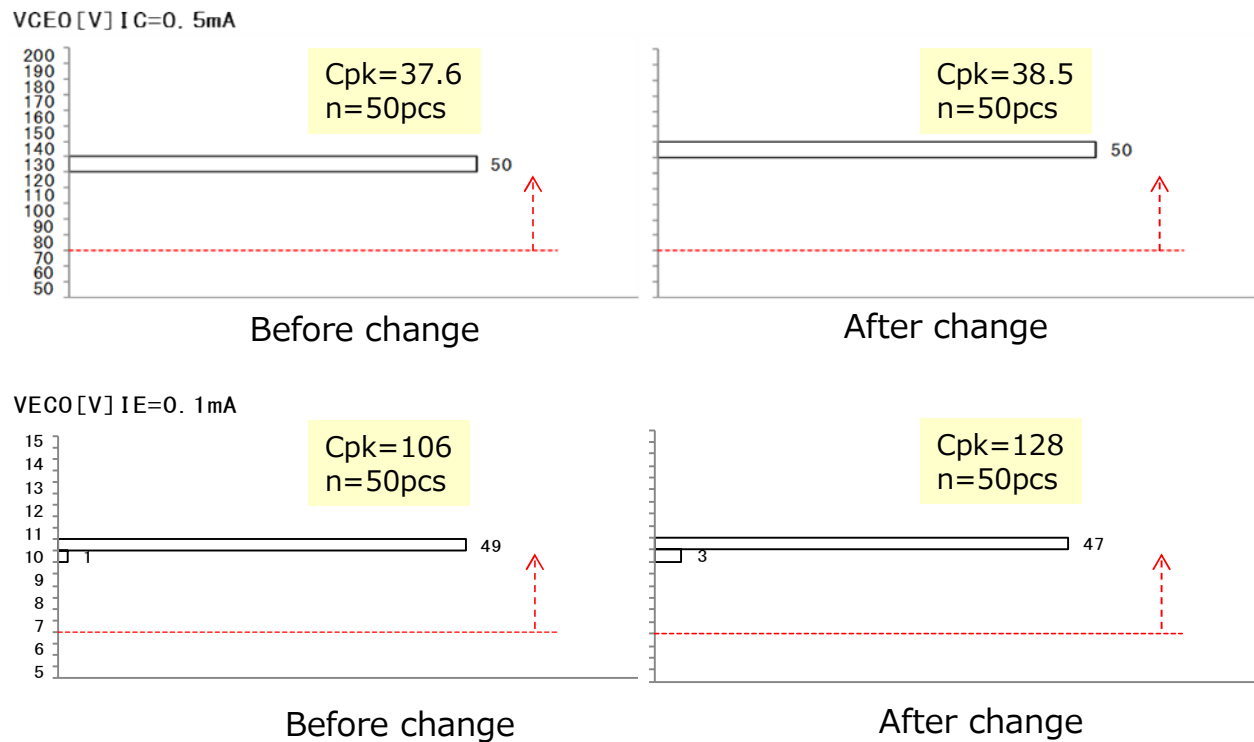
Part No. : TLP293



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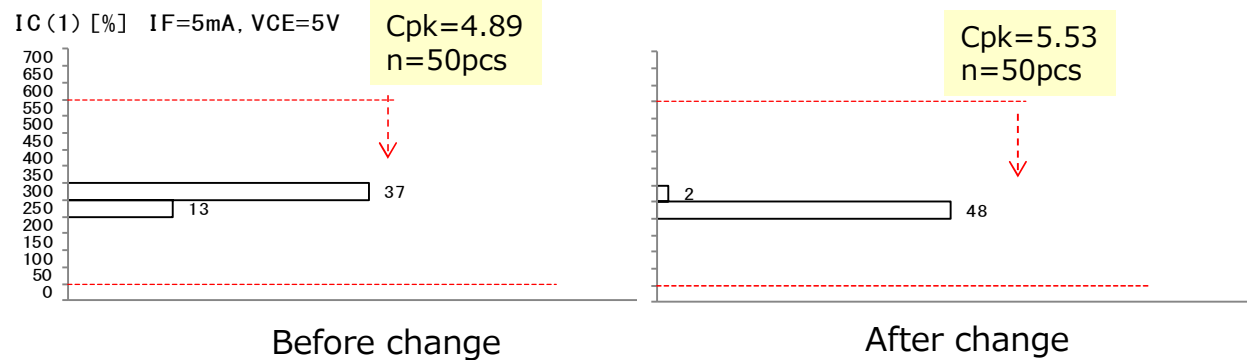
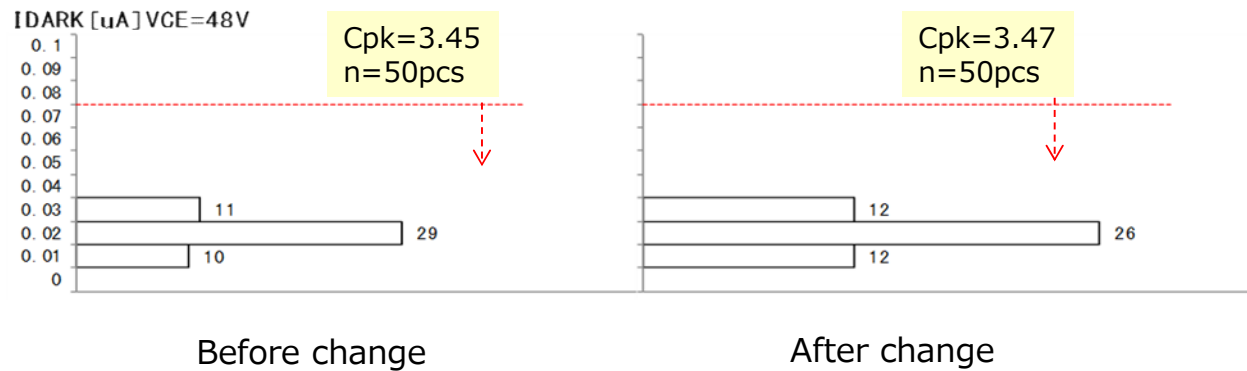
Initial characteristics distribution

Part No. : TLP293



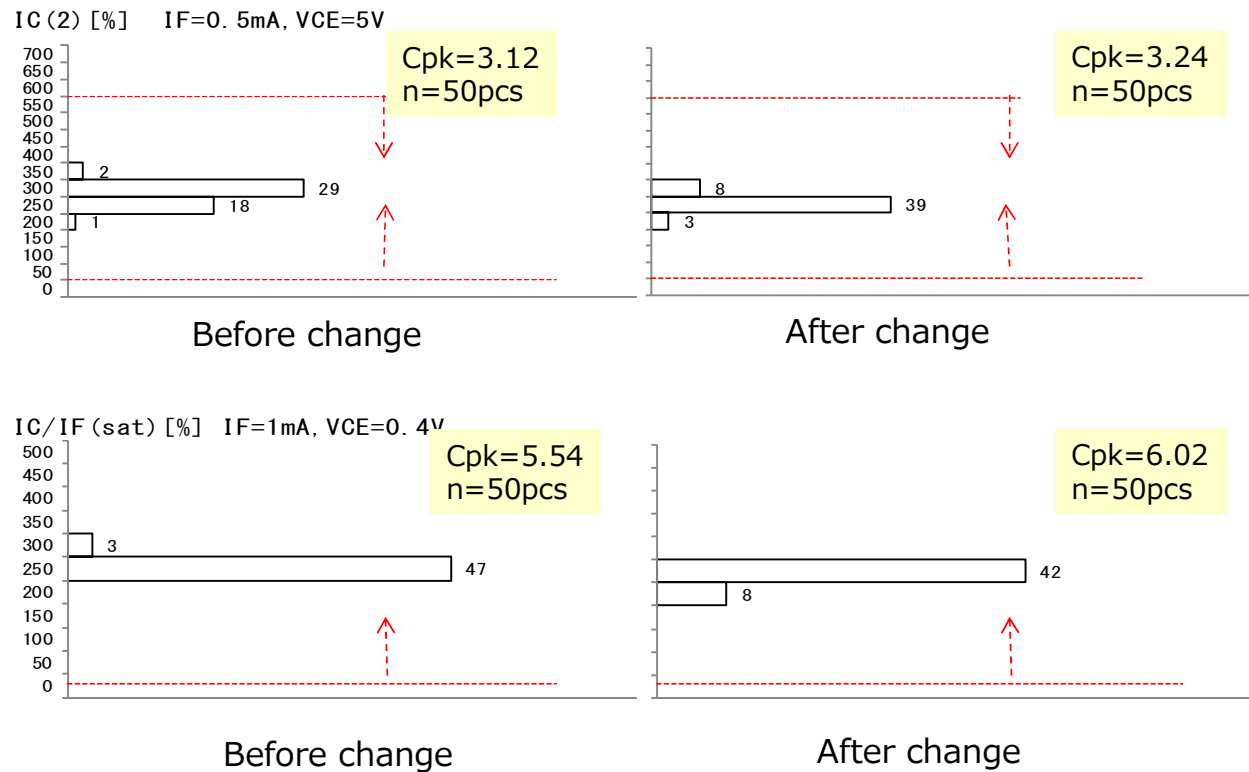
Initial characteristics distribution

Part No. : TLP293



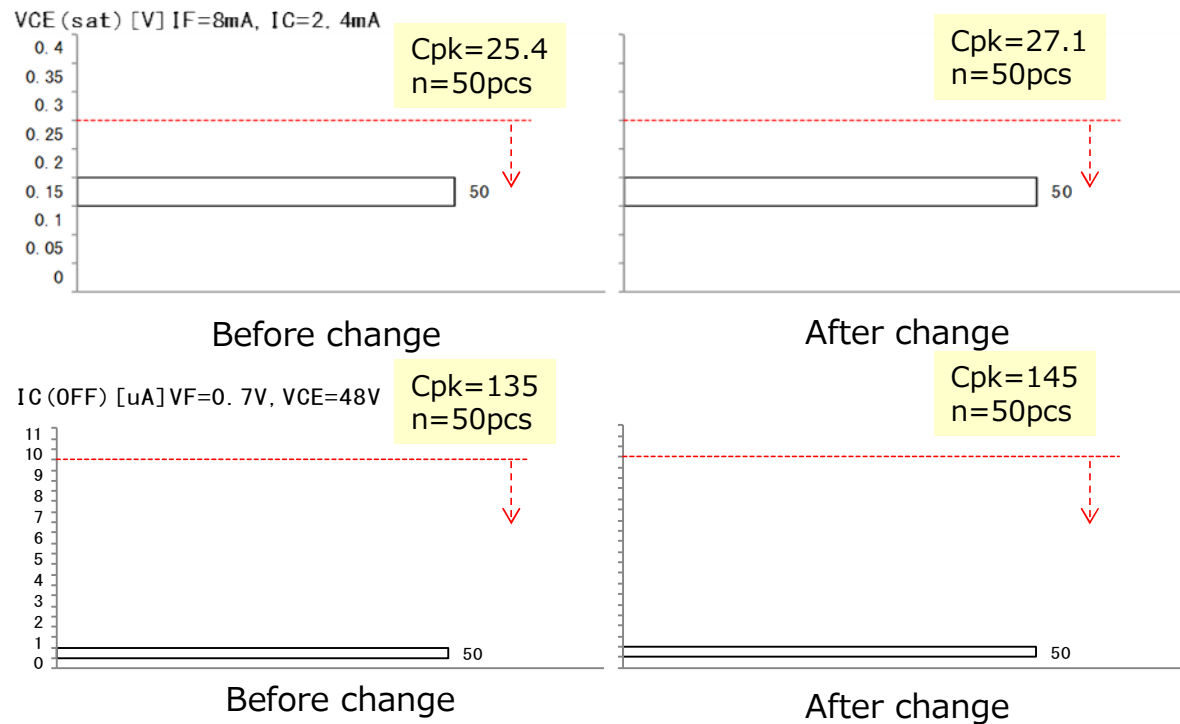
Initial characteristics distribution

Part No. : TLP293



Initial characteristics distribution

Part No. : TLP293



Comparing to the conventional product,
process capability of changed products is equivalent or more.

Application test data (ESD test)

Part No. : TLP293

Test result: Machine mode (MM)

Test condition : C=200pF, R= 0Ω, Applying once

Part No.	Test result(±200V) : Failed Q'ty / Tested Q'ty	
TLP29 3	Before change	0/10 pcs
	After change	0/10 pcs

Changed product demonstrated sufficient performance.

Test result: Human Body Model (HBM)

Test condition : C= 100pF, R= 1.5 kΩ, Applying once

Part No.	Test result(±2000V) : Failed Q'ty / Tested Q'ty	
TLP293	Before change	0/10 pcs
	After change	0/10 pcs

Changed product demonstrated sufficient performance.

Test result: Charged Device Model (CDM)

JEITA test condition: Applying once

Part No.	Test result(± 5 00V) : Failed Q'ty / Tested Q'th	
TLP293	Before change	0/10 pcs
	After change	0/10 pcs

Changed product demonstrated sufficient performance.

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Reliability test result

Part No. : TLP293 (Representative)

No.	Test item	Test condition	Judgement (Failed Q'ty / Tested Q'ty)		
			Test time	Before change	After change
1	Continuous operation	Ta=125°C,IF=12mA,Po=14mW	1000 h	0/60 pcs	0/60 pcs
2	High temperature storage	Ta=125°C	1000 h	0/60 pcs	0/60 pcs
3	High temperature High humidity Continuous operation	Ta=85°C, RH=85%, VCE=80V	1000 h	0/60 pcs	0/60 pcs
4	Pressure cooker	Ta=121°C, 203kPa (No-condensation)	96 h	0/60 pcs	0/60 pcs
5	Temperature cycling	-55°C(30 min)~125°C(30 min)	300 cycle	0/60 pcs	0/60 pcs

* Pre-treatment (saturated absorption + reflow) was conducted for all test items

No failure occurred in each test item. We therefore conclude that changed product has equivalent level with the conventional product.

Conclusion

As explained in the report, we have obtained the equivalent results at each test before and after the change.

Consequently, we would like to ask your consideration for the approval of consolidation of Tr chip.

Your understanding and corporation would be highly appreciated.

TOSHIBA