## / Descriptions

TO-220FL ṂṂ Ė Ñ ɻ ᴥ ‖ ὐ ч ᒣ

Insulated-Gate Bipolar Transistor in a TO-220FL Plastic Package

## / Features

650V/15A $V_{CE(SAT)}$= 1.60V(typ.) @$I_C$= 15A

ὃ ᔕ Ầ ʜ Fast Switching

Ḥ $V_{CE(SAT)}$ Low $V_{CE(SAT)}$

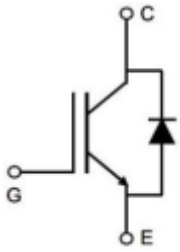
ῆ ғ β HF Product.

## / Applications

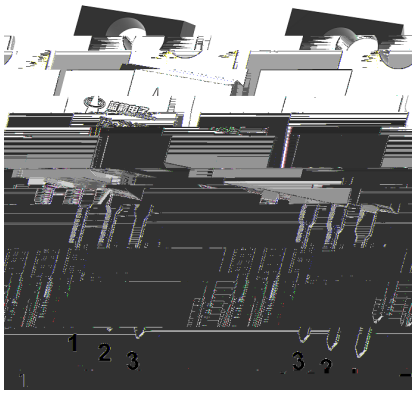
Ɔ ἰ Ʊ ı ᓓ ᴐ Ⱦ Ɔ ᴴ ı ∩ ᓓ ᵀ ♬ ᴴ

Motor Drives, OBC,PTC.

## / Equivalent Circuit




## / Pinning




PIN1 χ G PIN 2 χ C PIN 3 χ E

## / Marking

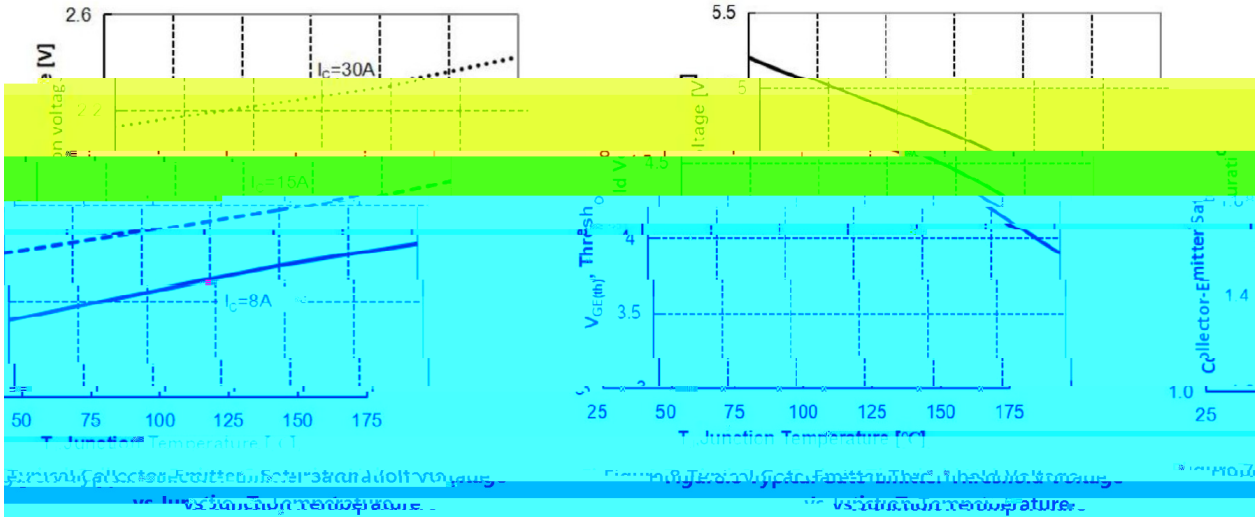
ὃ ᴍ ᒣ ب ˝

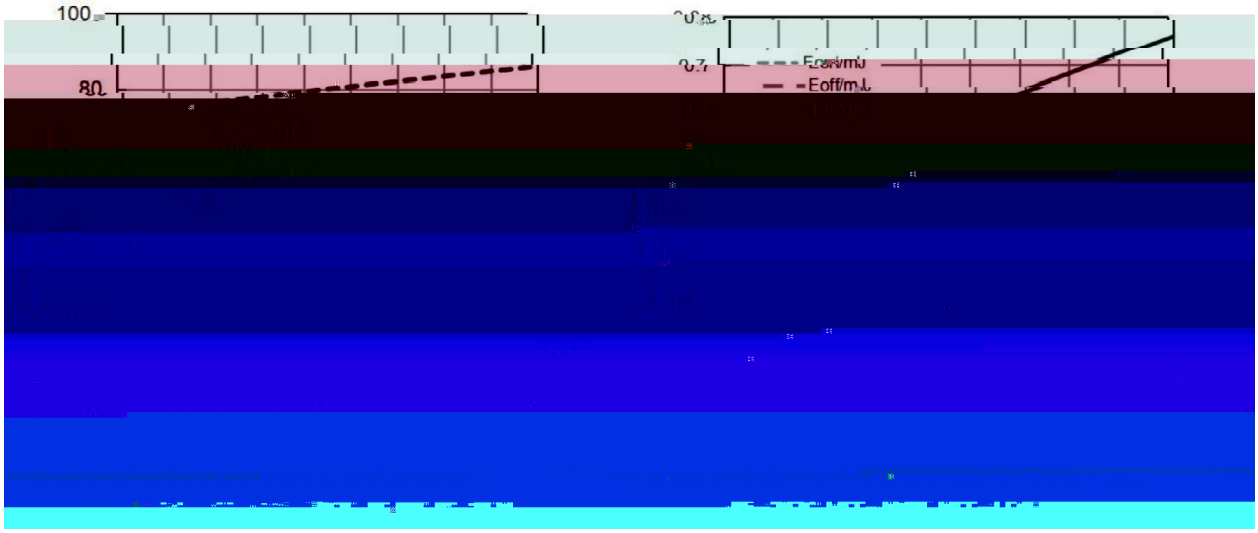
See Marking Instructions.

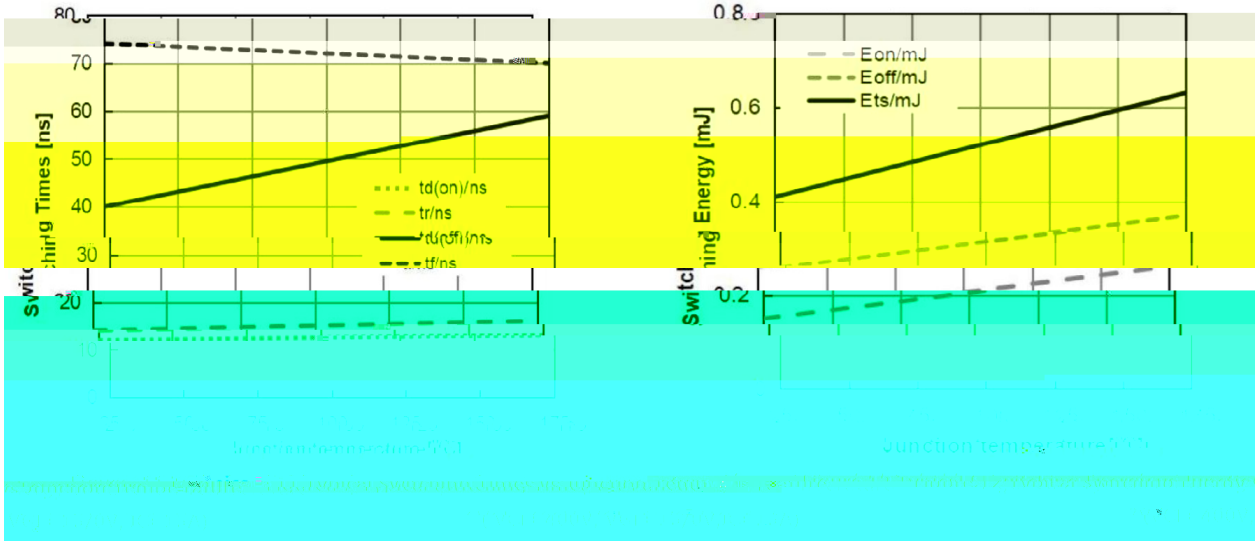
| v ̈Ω<br>Parameter | | ↰ N<br>Symbol | ̈Ω Ö<br>Rating | D Ч<br>Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CES}$ | 650 | V |
| Gate-Emitter Voltage | | $V_{GES}$ | ± 30 | V |
| Continuous Collector Current | $T_C$=+25 | $I_C$ | 30 | A |
| | $T_C$=+100 | | 15 | A |

| v ̈Ω<br>Parameter | ϒ N<br>Symbol | ╨ :ˆ ϯ<br>Test Conditions | ѡ ṇ Ө<br>Min | Ɛ ȝ Ө<br>Typ | ѡ ᶻ Ө<br>Max | ᴅ Ꮒ<br>Unit |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{ies}$ | $V_{GE}$=0V, $V_{CE}$=25V, f=1MHz | | 791 | | pF |
| Output Capacitance | $C_{oes}$ | | | 130 | | pF |
| Reverse Transfer Capacitance | $C_{res}$ | | | 33 | | pF |
| Total Gate Charge | $Q_g$ | $V_{GE}$=15V, $V_{CC}$=520V, $I_C$=15A | | 45 | | nC |
| Gate to Emitter Charge | $Q_{ge}$ | | | 7 | | nC |
| Gate to Collector Charge | $Q_{gc}$ | | | 23 | | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $T_J$=25 , $V_{GE}$=15V,$V_{CC}$=400V, $I_C$=15A, $R_G$=5 Inductive Load | | 12 | | ns |
| Turn-On Rise Time | $t_r$ | | | 14 | | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 40 | | ns |
| Turn-Off Fall Time | $t_f$ | | | 74 | | ns |
| Turn-On Energy | $E_{on}$ | | | 0.15 | | mJ |
| Turn-Off Energy | $E_{off}$ | | | 0.26 | | mJ |
| Total Switching Energy | $E_{ts}$ | | | | | |

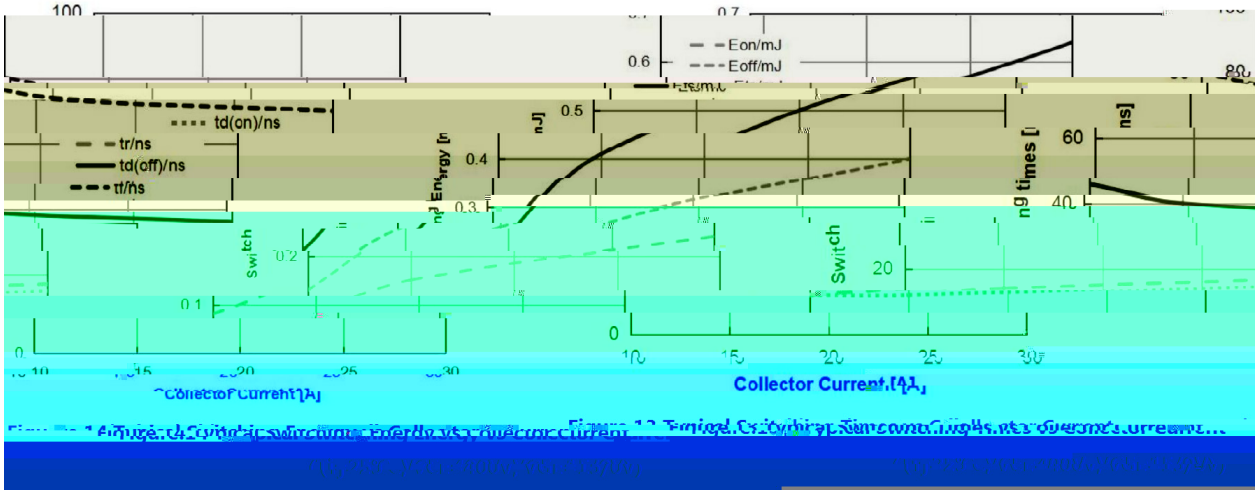
## / Electrical Characteristic Curve

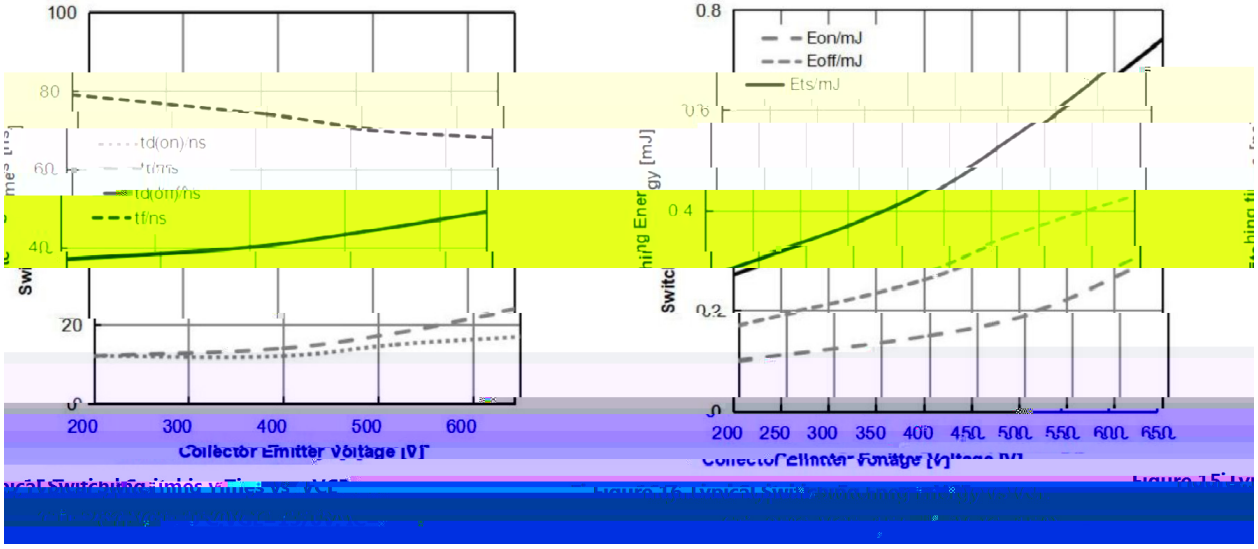


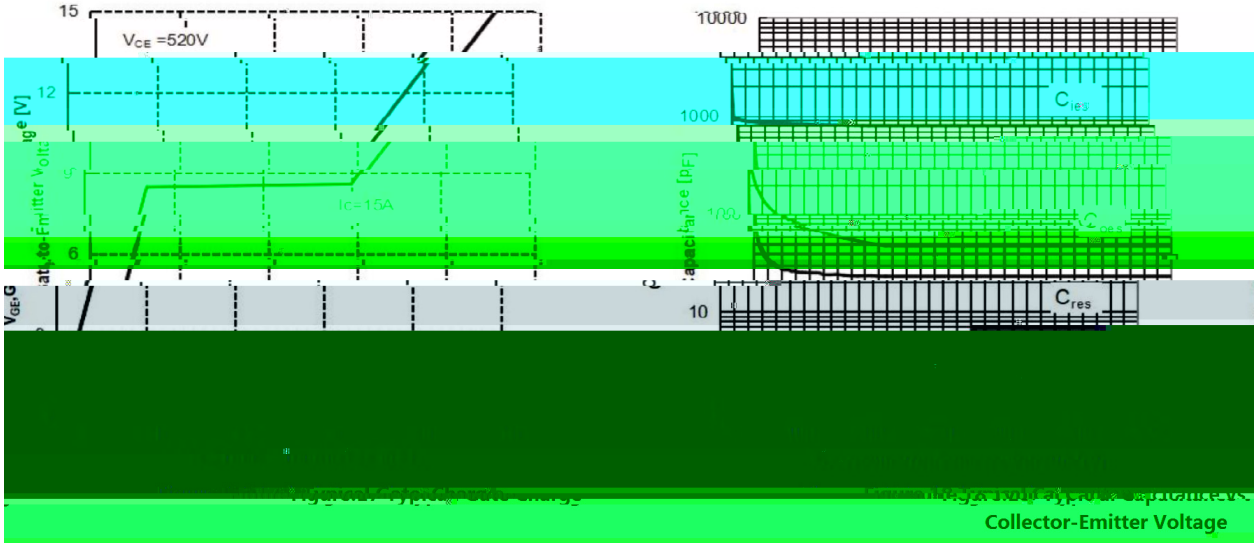



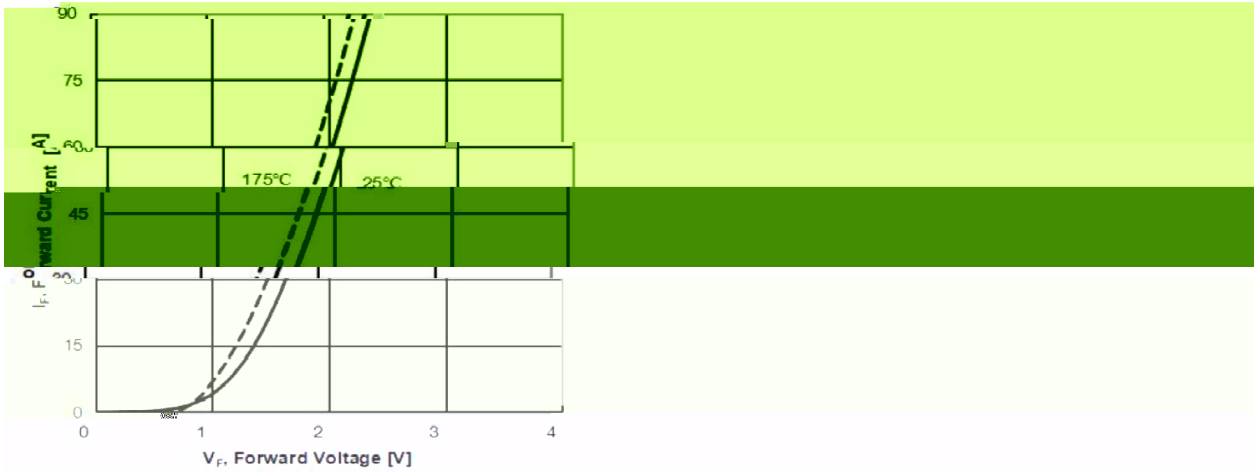
## / Electrical Characteristic Curve



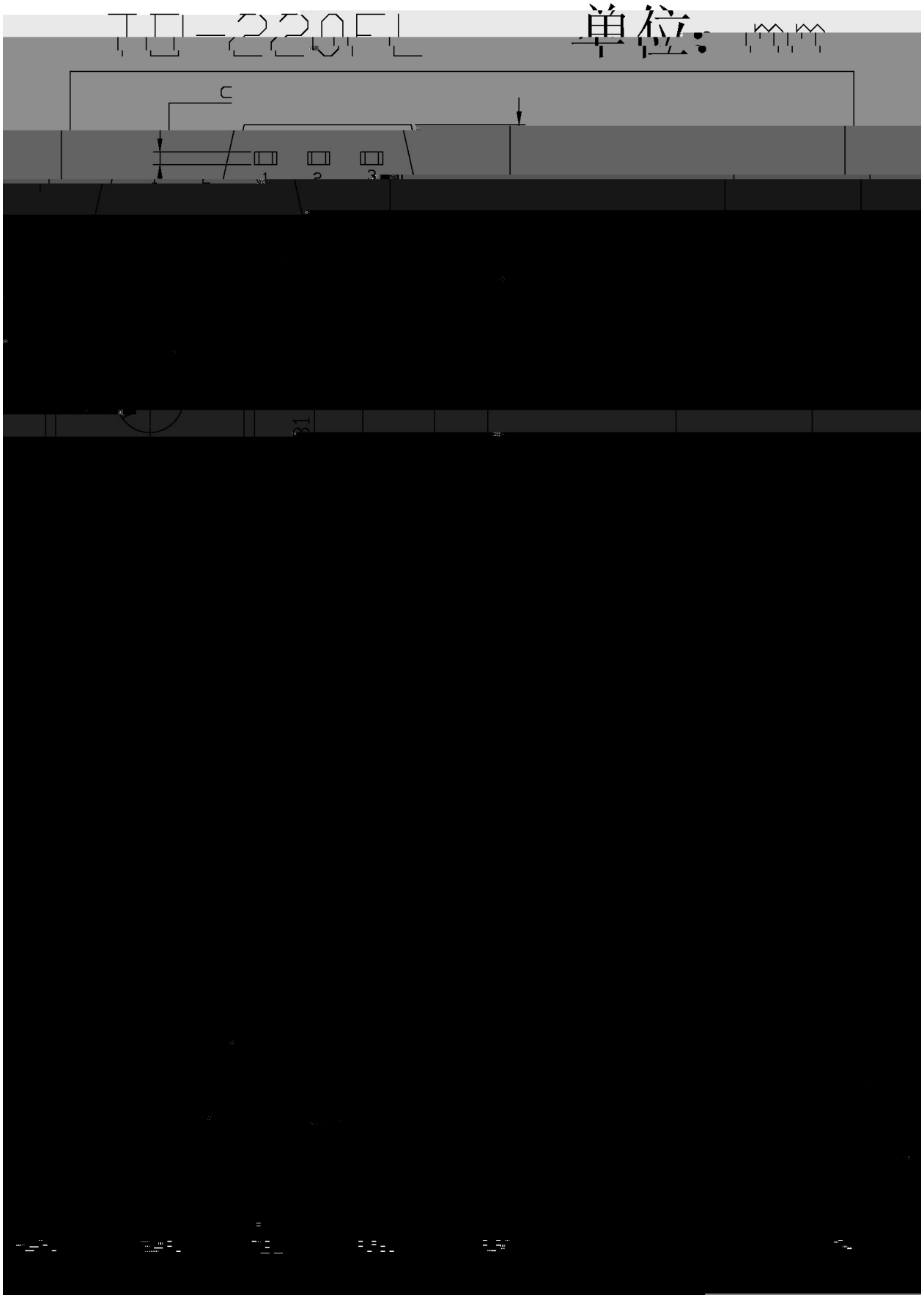



## / Electrical Characteristic Curve

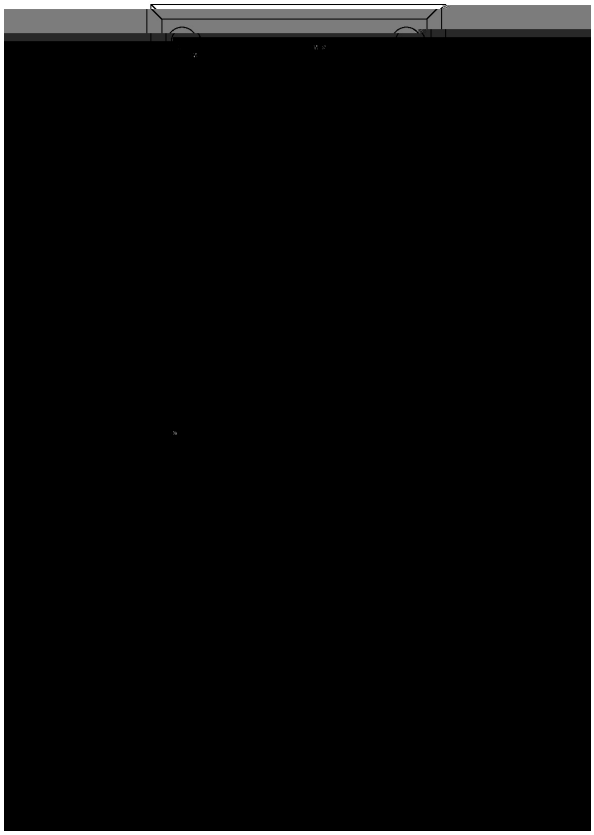



Typical Diode Forward Current vs Forward Voltage Figure.19

## / Package Dimensions



## / Marking Instructions

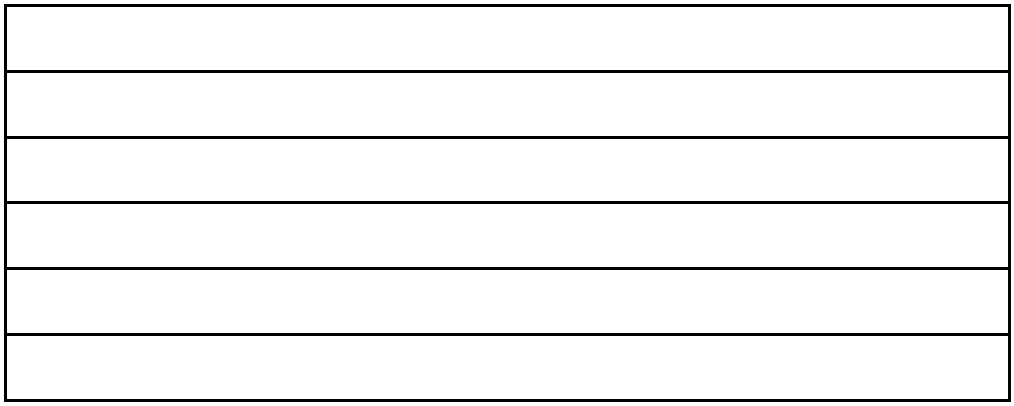


| | |
|---|---|
| BR χ | |
| GB15N65 χ | |
| ---- χ | |

Note:

| | |
|---|---|
| BR: | Company Code |
| GB15NN65: | Product Type Code |
| ****: | Lot No. Code, code change with Lot No |

## ( ) / Temperature Profile for Dip Soldering(Pb-Free)



ِ ˜ χ

1 Ĺ ♬ □ ẙ 25 Ḱ 150 ł ı `H ڑ 60 Ḱ 90sec;

2 Š Ө □ ẙ 255 ° 5 ł ı `H ڑ `Y ∧ ₦ 5 ° 0.5sec;

3 ì ˙ ٧ ¸ ɔ ﷺ ẙ ₦ 2 Ḱ 10 ł /sec.

Note:

1.Preheating:25~150 ł , Time:60~90sec.

2.Peak Temp.:255 ° 5 ł , Duration:5 ° 0.5sec.

3. Cooling Speed: 2~10 ł /sec.

## / Resistance to Soldering Heat Test Conditions

705 ° 5 ł ɣ 10 ° (T)10769(e)147(m(.:70±55)]TJ/T107 1 Tf5.05757 0 TD0 Tc0 Tw
#>û ‘UO