/ Descriptions

TO-220FL

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

/ Features

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

Fast Switching

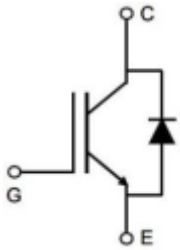
$V_{CE(SAT)}$ Low $V_{CE(SAT)}$

HF Product.

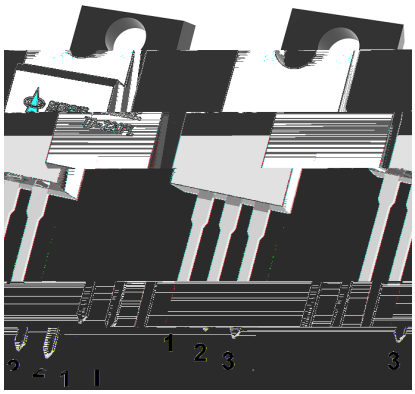
/ Applications

Motor Drives, OBC,PTC.

/ Equivalent Circuit



/ Pinning



PIN1 G PIN 2 C PIN 3 E

/ Marking

See Marking Instructions.

Parameter		Symbol	Rating	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
Pulsed Collector Current , Limited by T_{Jmax}		I_{CM}	60	A
Continuous Diode Forward Current	T_C=+25	I_F	30	A
	T_C=+100		15	A
Diode Maximum Forward Current, limited by T_{Jmax}		I_{FM}	60	A
Power Dissipation	T_C=+25	P_D	152	W
	T_C=+100		78	W
Operating and Storage Temperature Range		T_J,T_{STG}	-55 to +175	
Maximum Junction-to-Ambient		$R_{\theta JA}$	60	/W
Maximum IGBT Junction-to-Case		$R_{\theta JC}$	4.0	/W
Maximum Diode Junction-to-Case		$R_{\theta JC}$	4.8	/W

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage	BV_{CES}	I_C=250uA, V_{GE}=0V		650			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=15A	T_J=25		1.60	1.85	V
			T_J=125		1.84		
			T_J=175		2.05		
Diode Forward Voltage	V_F	V_{GE}=0V, I_F=15A	T_J				

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	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=5Ω 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}			0.41		mJ
Diode Reverse Recovery Time	T_{rr}	T_J=25 ,I_F=15A, di/dt=200A/us		70		ns
Diode Reverse Recovery Charge	Q_{rr}			0.5		uC
Diode Peak Reverse Recovery Current	I_{rm}			8.0		A
Turn-On Delay Time	$t_{d(on)}$	T_J=175 , V_{GE}=15V,V_{CC}=400V, I_C=15A, R_G=5Ω Inductive Load		13		ns
Turn-On Rise Time	t_r			16		ns
Turn-Off Delay Time	$t_{d(off)}$			59		ns
Turn-Off Fall Time	t_f			70		ns
Turn-On Energy	E_{on}			0.26		mJ
Turn-Off Energy	E_{off}			0.37		mJ
Total Switching Energy	E_{ts}			0.63		mJ
Diode Reverse Recovery Time	T_{rr}	T_J=175 ,I_F=15A, di/dt=200A/us		86		ns
Diode Reverse Recovery Charge	Q_{rr}			0.7		uC
Diode Peak Reverse Recovery Current	I_{rm}			9.4		A

/ Electrical Characteristic Curve

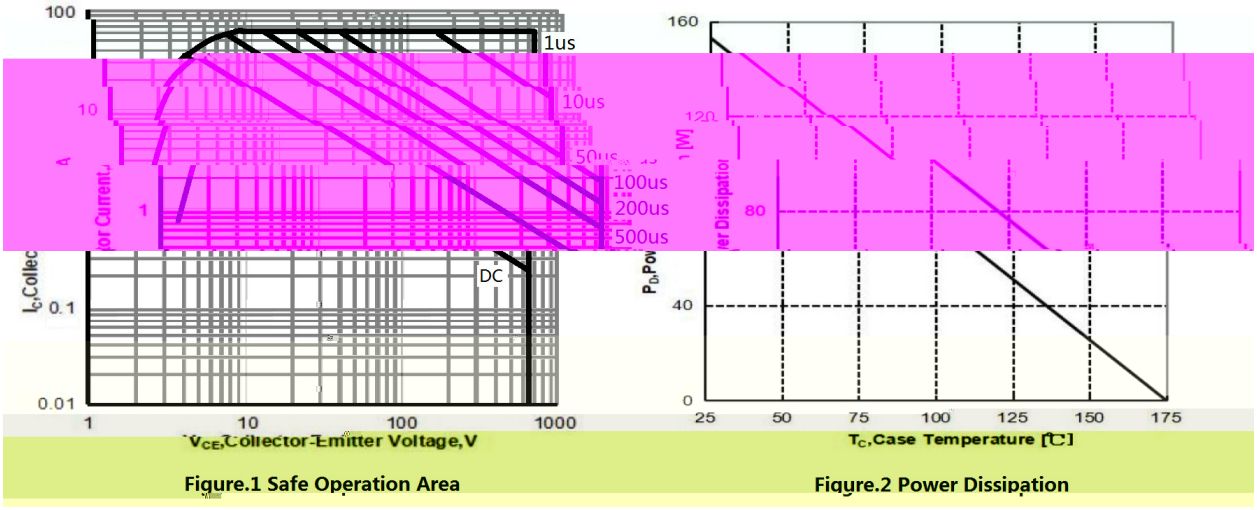


Figure.1 Safe Operation Area

Figure.2 Power Dissipation

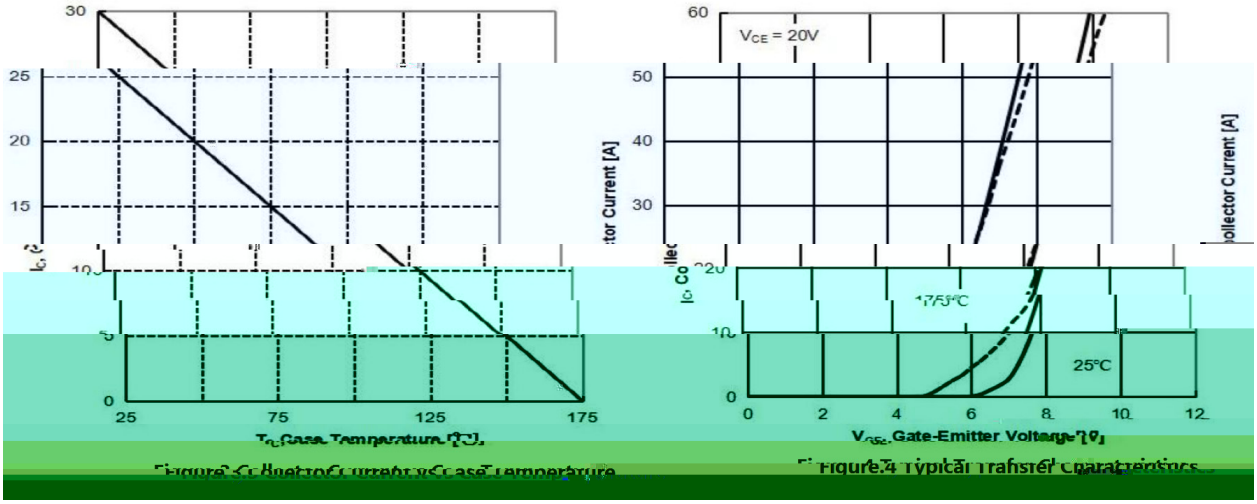


Figure.3 Collector Current vs Case Temperature

Figure.4 Typical Transfer Characteristics

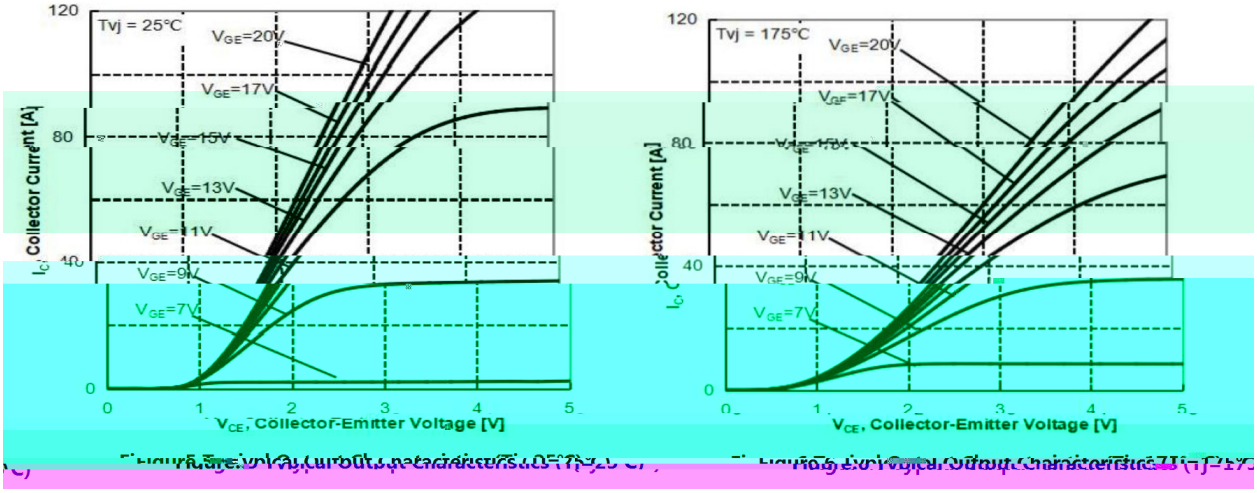
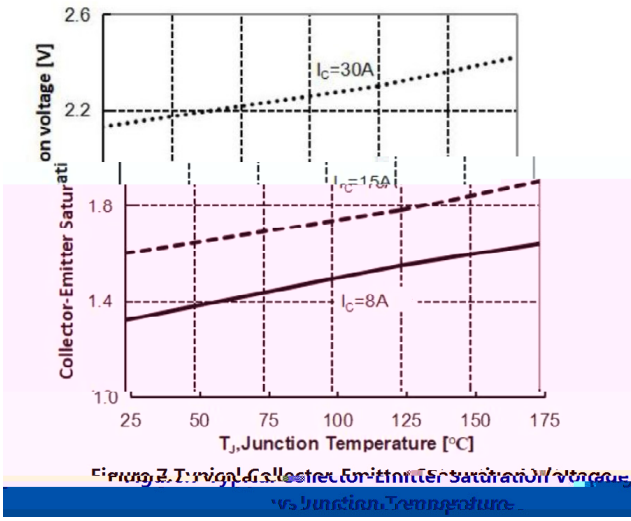
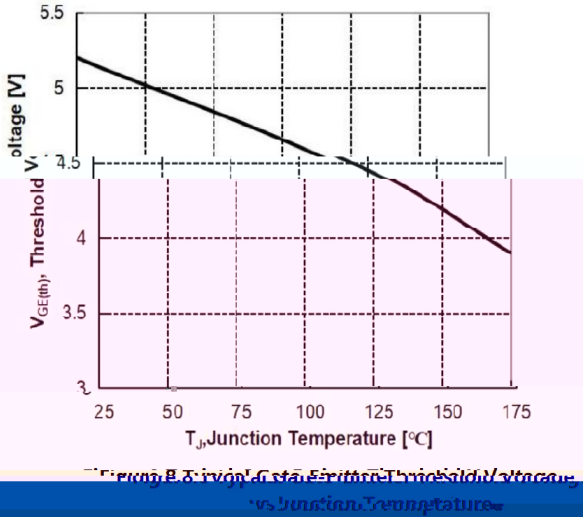


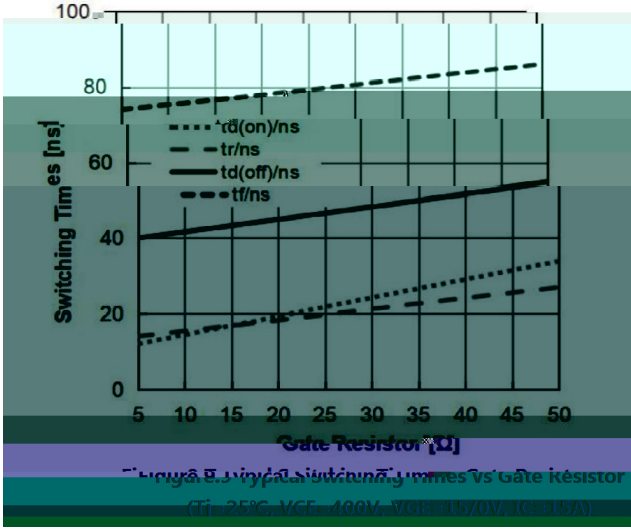
Figure.5 Typical Output Characteristics (Tvj= 25°C)

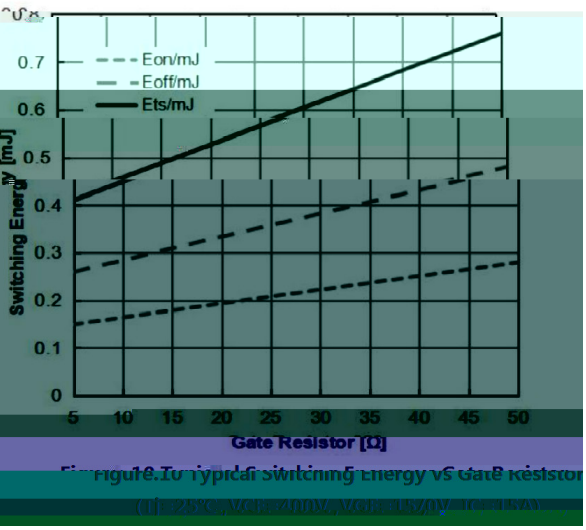
Figure.6 Typical Output Characteristics (Tvj= 175°C)

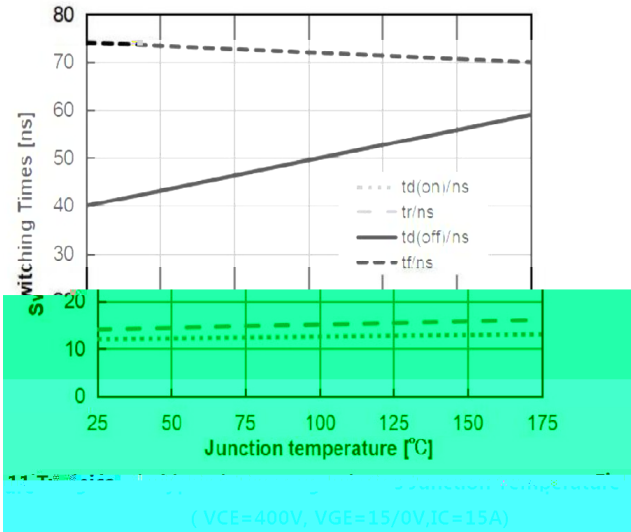
/ Electrical Characteristic Curve

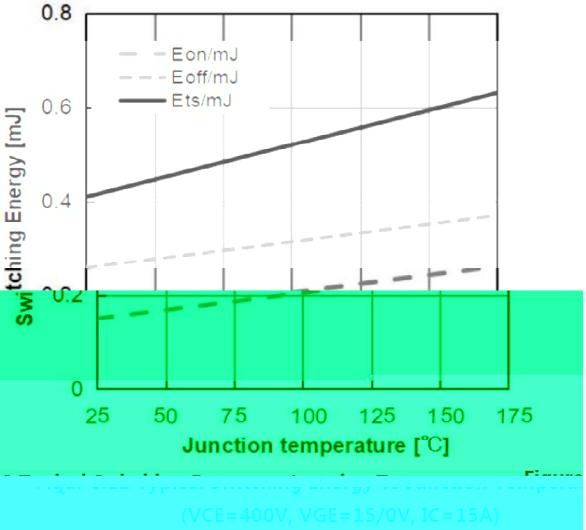




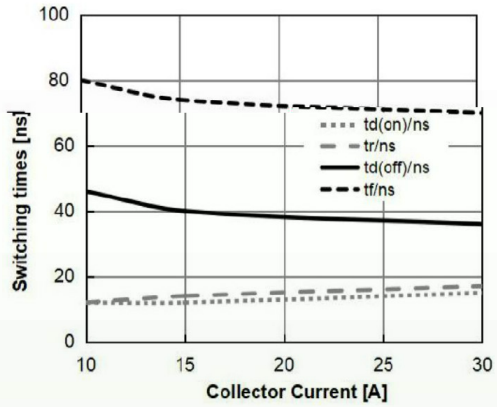


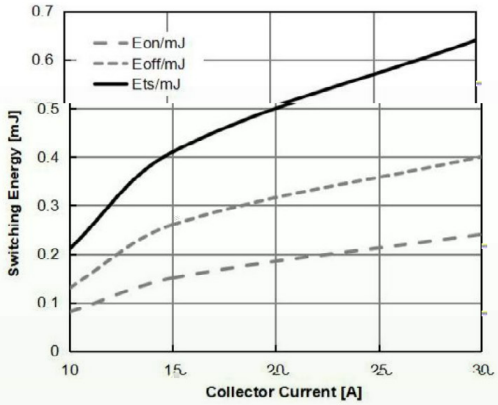


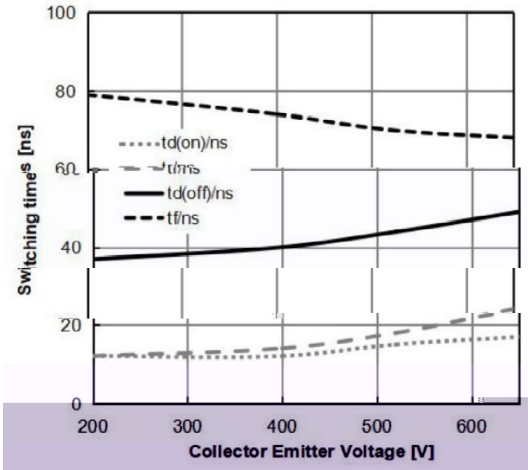


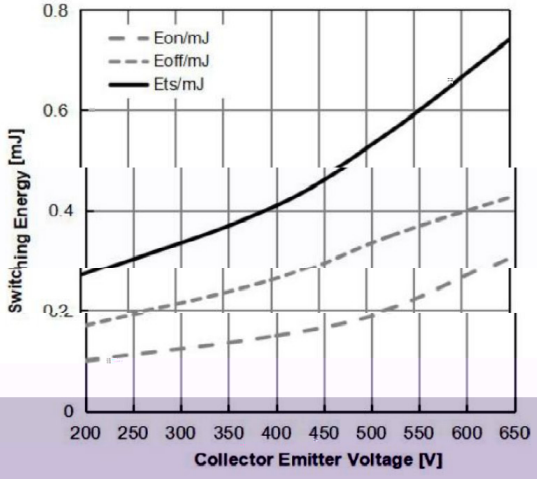


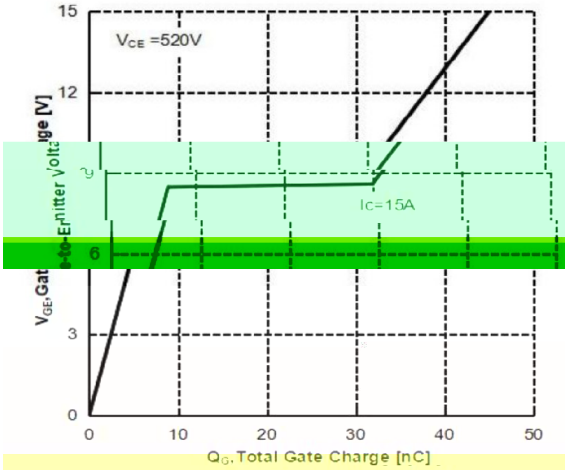
/ Electrical Characteristic Curve

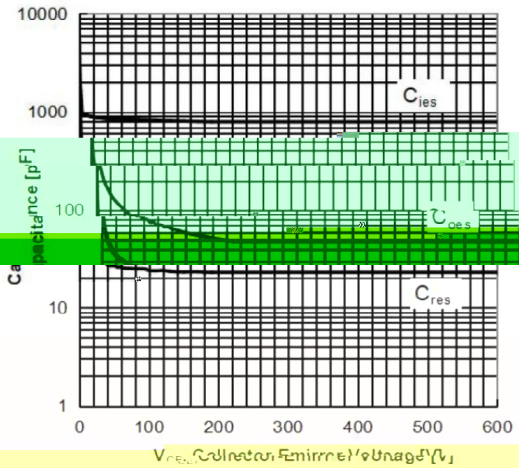












/ Electrical Characteristic Curve

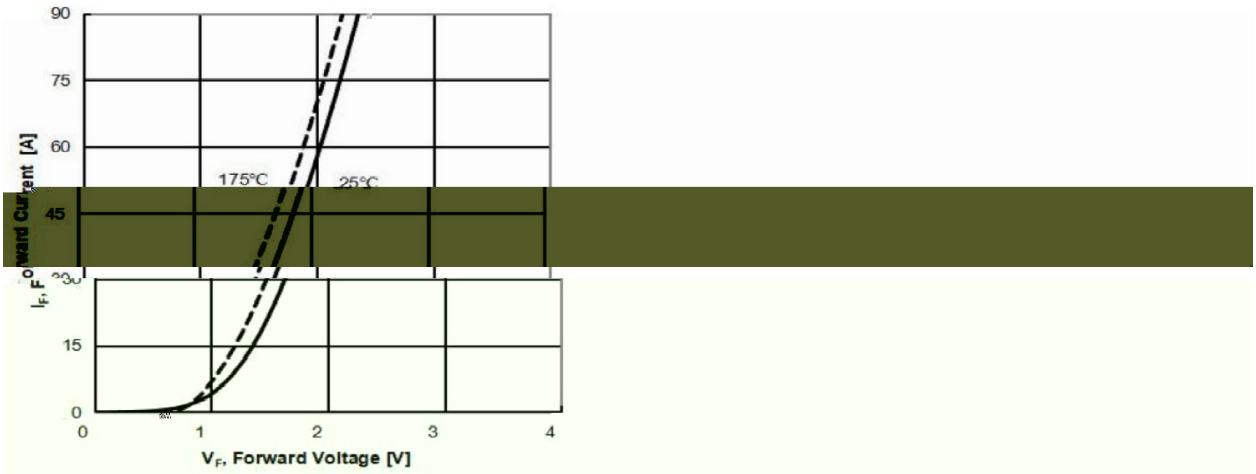
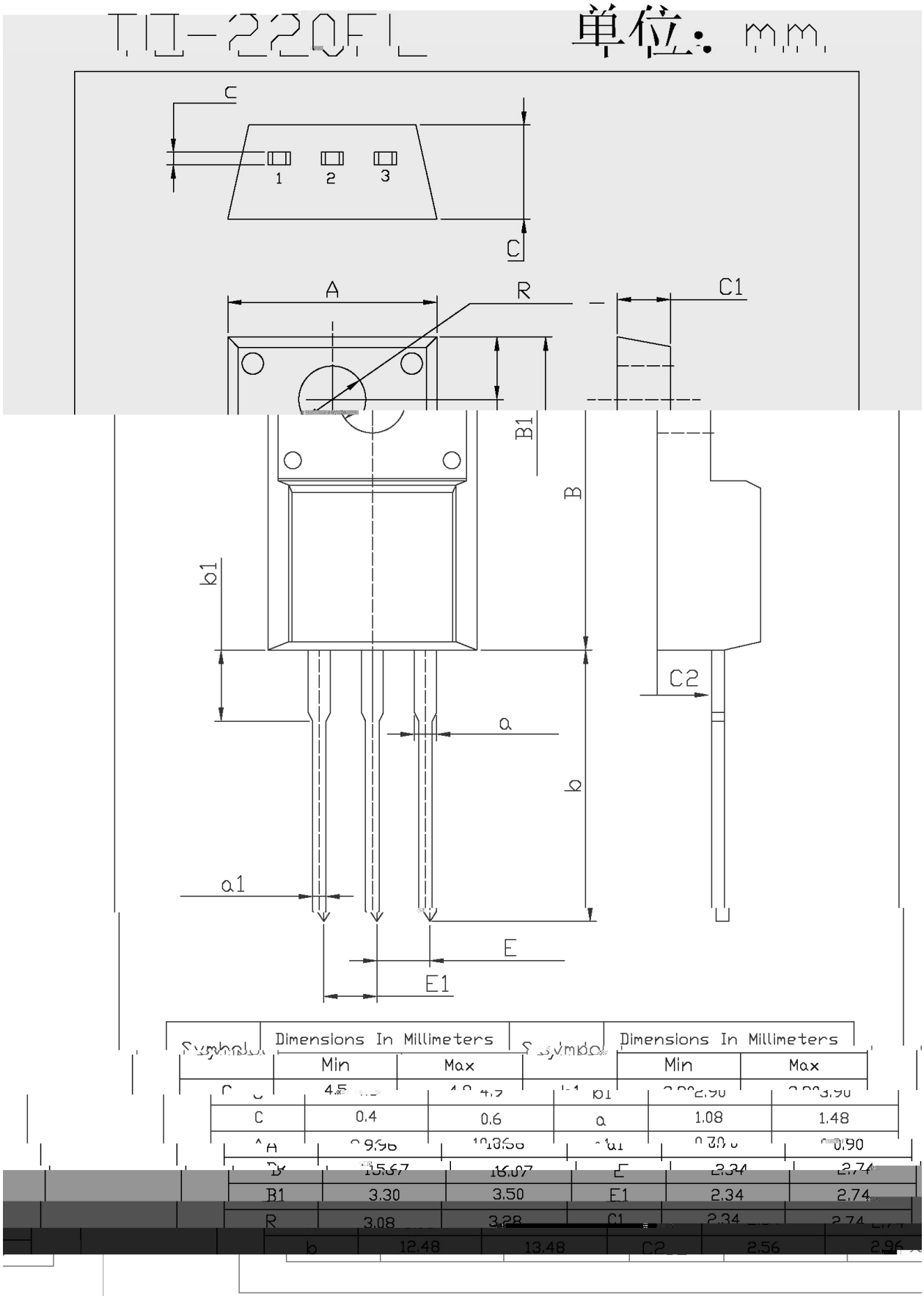


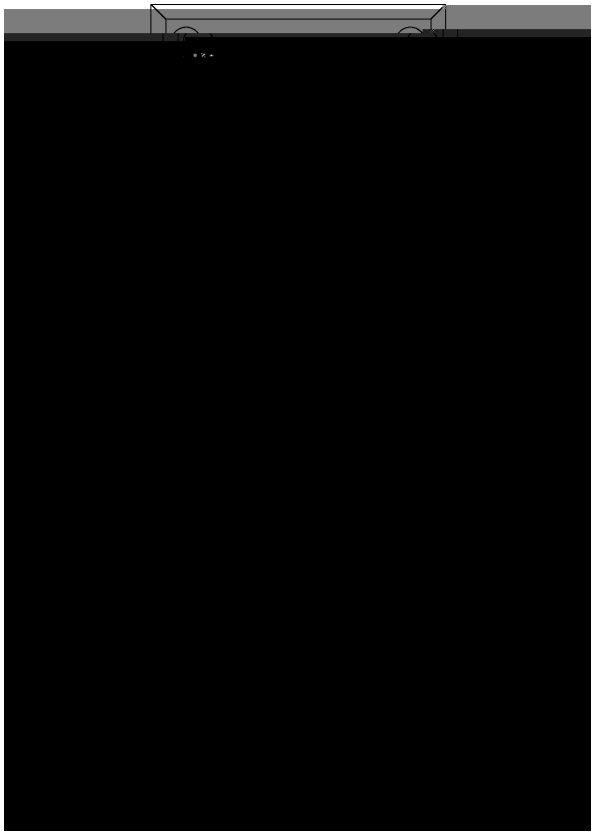
Figure.19 Typical Diode Forward Current vs Forward Voltage

/ Package Dimensions



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
c	0.4	0.6	a	1.08	1.48
A	9.96	10.36	a1	0.70	0.90
D	15.67	16.07	E	2.34	2.74
B1	3.30	3.50	E1	2.34	2.74
R	3.08	3.28	C1	2.34	2.74
b	12.48	13.48	C2	2.56	2.96

/ Marking Instructions



BR

GB15N65

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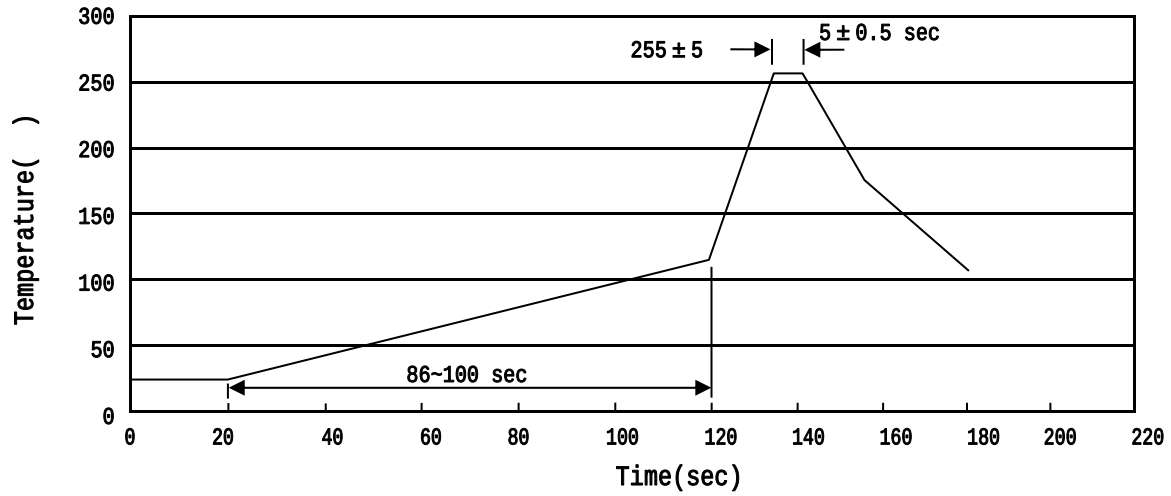
Note:

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

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



Note:

1	25	150	60	90sec;	1.Preheating:25~150 , Time:60~90sec.
2	255±5			5±0.5sec;	2.Peak Temp.:255±5 , Duration:5±0.5sec.
3		2	10	/sec.	3. Cooling Speed: 2~10 /sec.

/ Resistance to Soldering Heat Test Conditions

270±5	10±1 sec.	Temp.:270±5	Time:10±1 sec

/ Packaging SPEC.

/ TUBE

Package Type	Units					Dimension		(unit mm³)
TO-220FL	50	20	1,000	5	5,000	532×33×7.0	555×164×50	575×290×180

/ Notices