

Rev.A Sep.-2023

TO-220FL

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

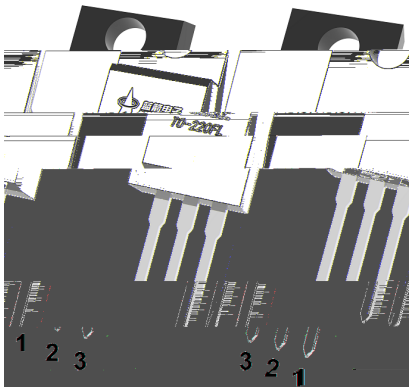
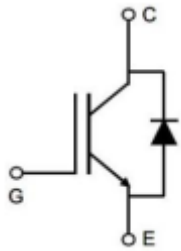
650V/15A $V_{CE(SAT)} = 1.60V(\text{typ.}) @ I_C = 15A$

Fast Switching

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

HF Product.

Motor Drives, OBC, PTC.



PIN1 G

PIN 2 C

PIN 3 E

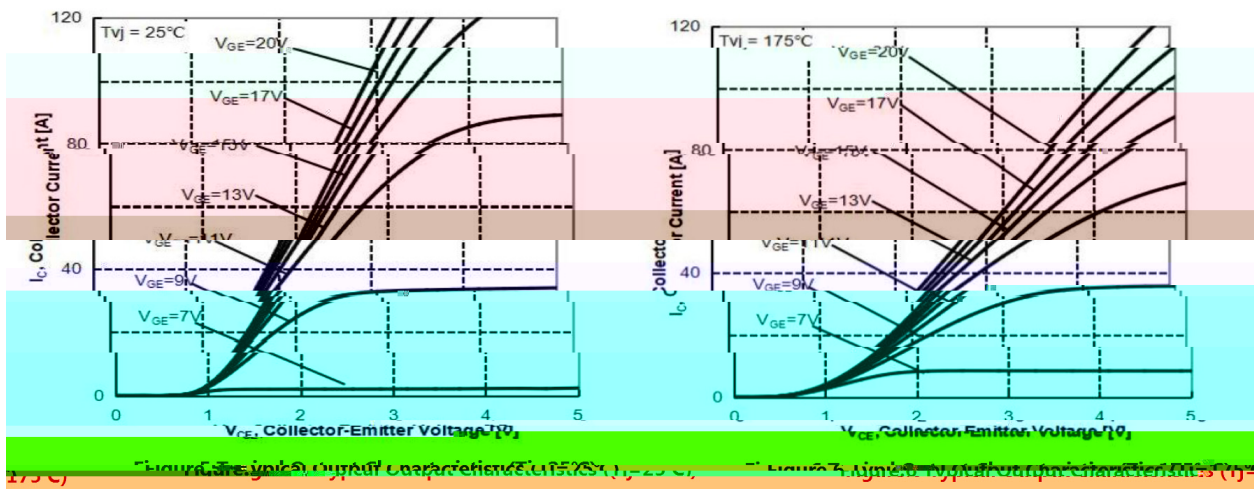
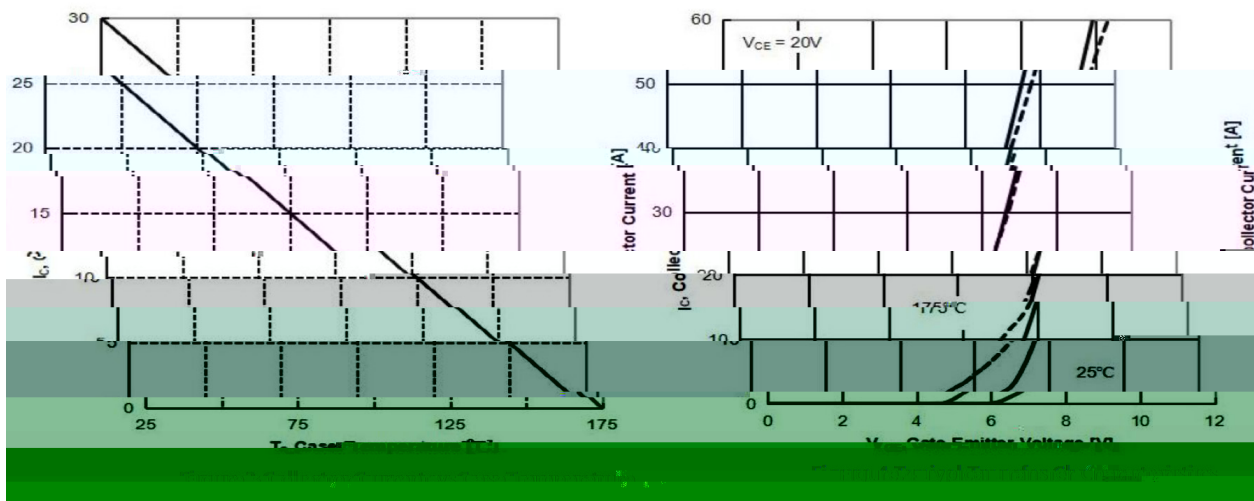
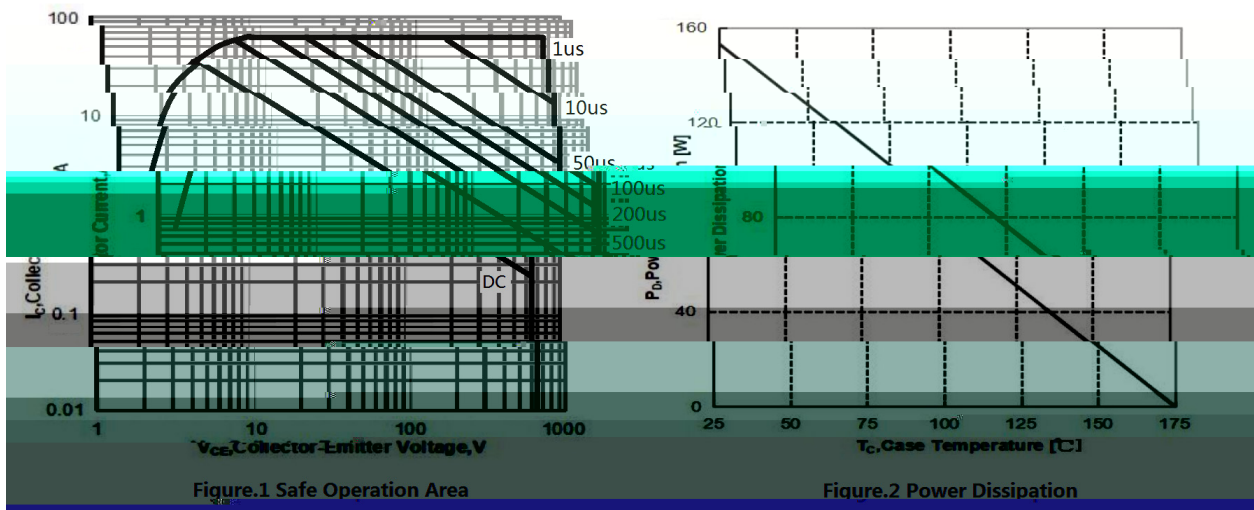
See Marking Instructions.

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}	$I_C=250\mu A, V_{GE}=0V$	650			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$	$T_J=25^\circ C$	1.60	1.85	V
			$T_J=125$	1.84		
			$T_J=175$	2.05		

Diode Forward Voltage V_F $V_{GE}=0V, I_F=15A$

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	$t_{d(on)}$	$T_J=25^\circ C,$ $V_{GE}=15V, V_{CC}=400V,$ $I_C=15A, R_G=5\Omega$ 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}	$T_J=25^\circ C, I_F=15A,$ $di/dt=200A/us$		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	$t_{d(on)}$	$T_J=175^\circ C,$ $V_{GE}=15V, V_{CC}=400V,$ $I_C=15A, R_G=5\Omega$ 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}	$T_J=175^\circ C, I_F=15A,$ $di/dt=200A/us$		86		ns
Diode Reverse Recovery Charge	Q_{rr}			0.7		uC
Diode Peak Reverse Recovery Current	I_{rm}			9.4		A



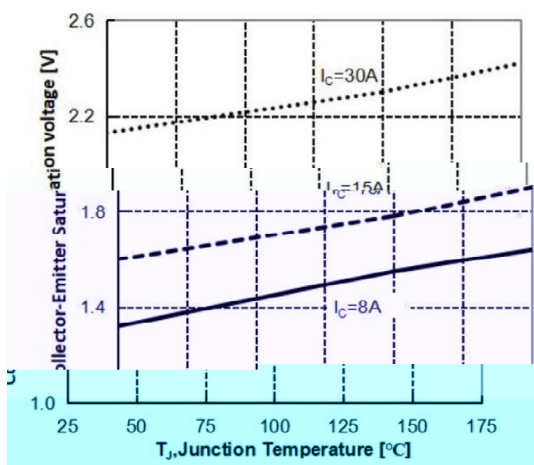


Figure 7: Collector-Emitter Saturation Voltage

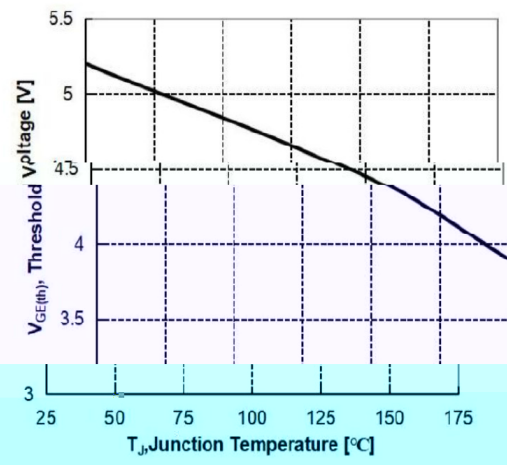


Figure 8: Gate-Source Threshold Voltage

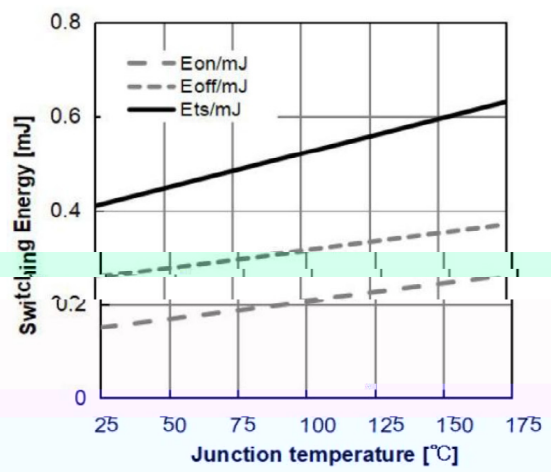
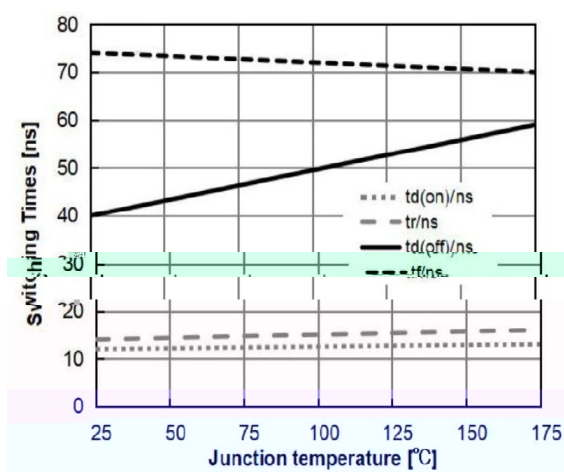
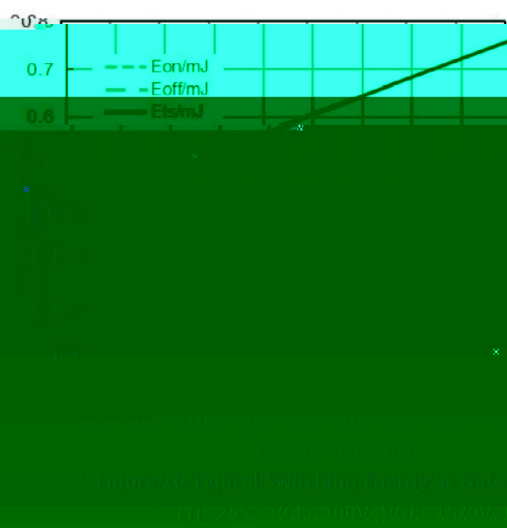
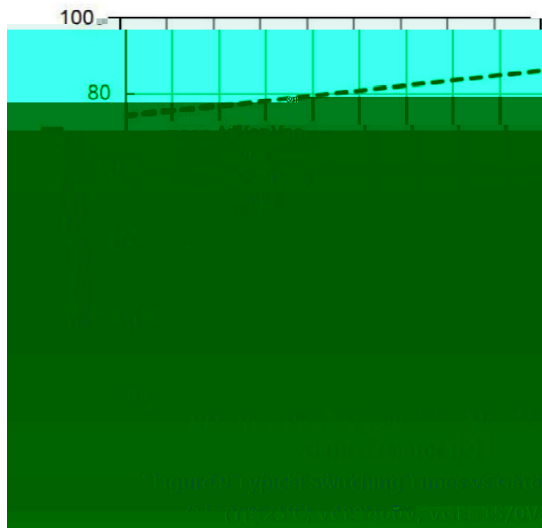


Figure 11: Switching Times vs. Junction Temperature

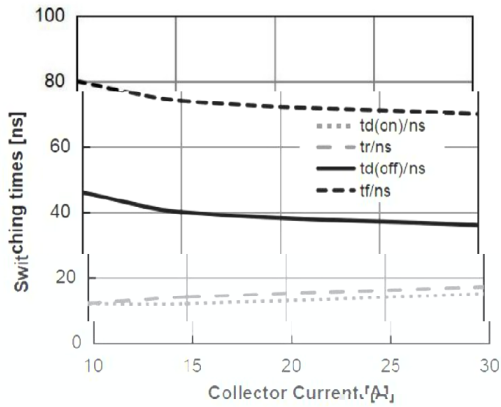


Figure 13 Typical Switching Times vs Collector Current
($T_J = 25^\circ\text{C}$, $V_{CE} = 400\text{V}$, $V_{GE} = 15\text{V}/0\text{V}$)

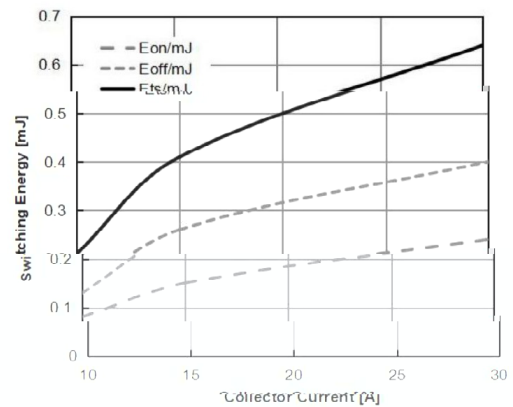


Figure 14 Typical Switching Energy vs Collector Current
($T_J = 25^\circ\text{C}$, $V_{CE} = 400\text{V}$, $V_{GE} = 15\text{V}$)

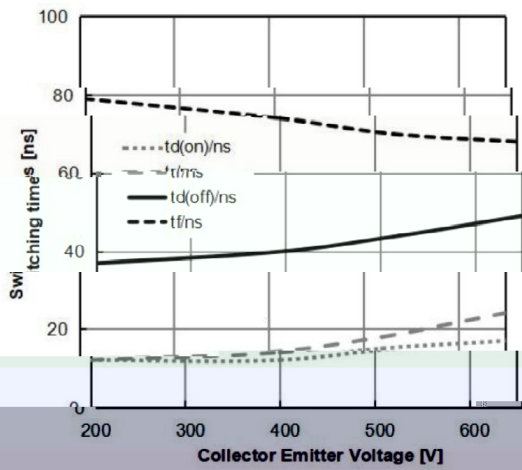


Figure 15 Typical Switching Times vs V_{CE}
($T_J = 25^\circ\text{C}$, $I_C = 15\text{A}$, $V_{GE} = 15\text{V}/0\text{V}$)

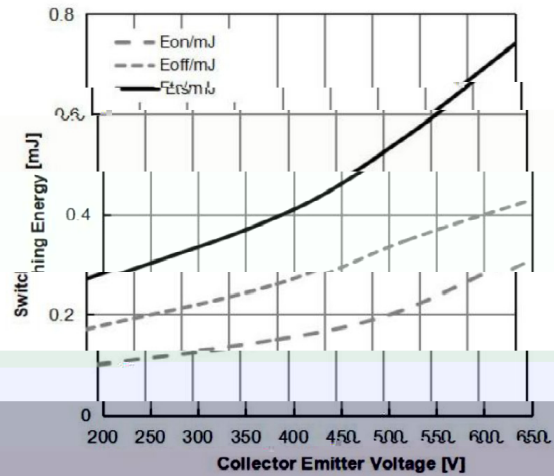


Figure 16 Typical Switching Energy vs V_{CE}
($T_J = 25^\circ\text{C}$, $I_C = 15\text{A}$, $V_{GE} = 15\text{V}$)

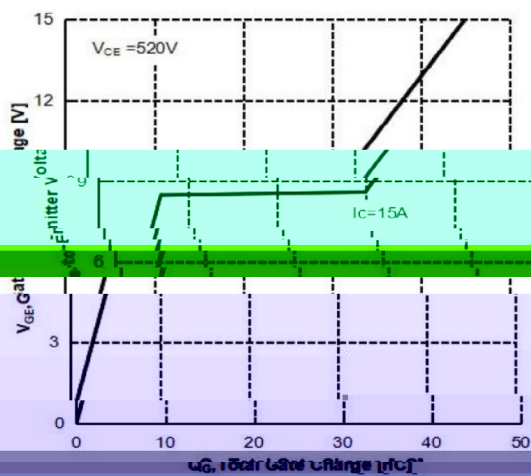


Figure 17 Typical Gate Charge

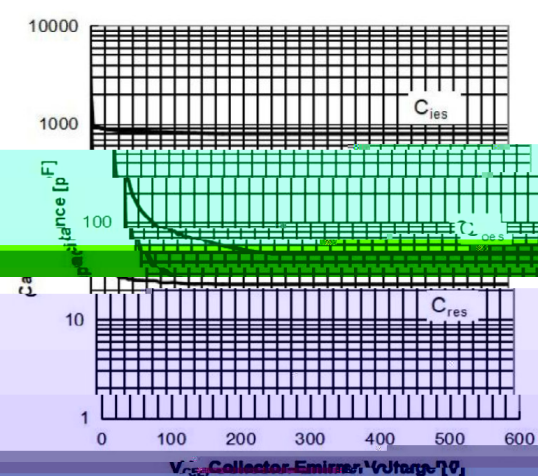


Figure 18 Typical Capacitance vs
Collector-Emitter Voltage

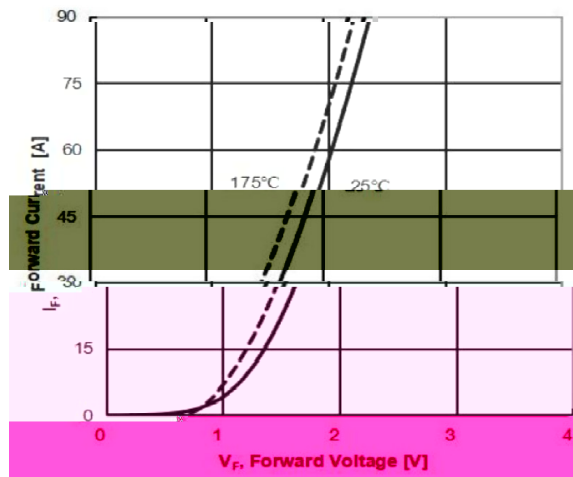
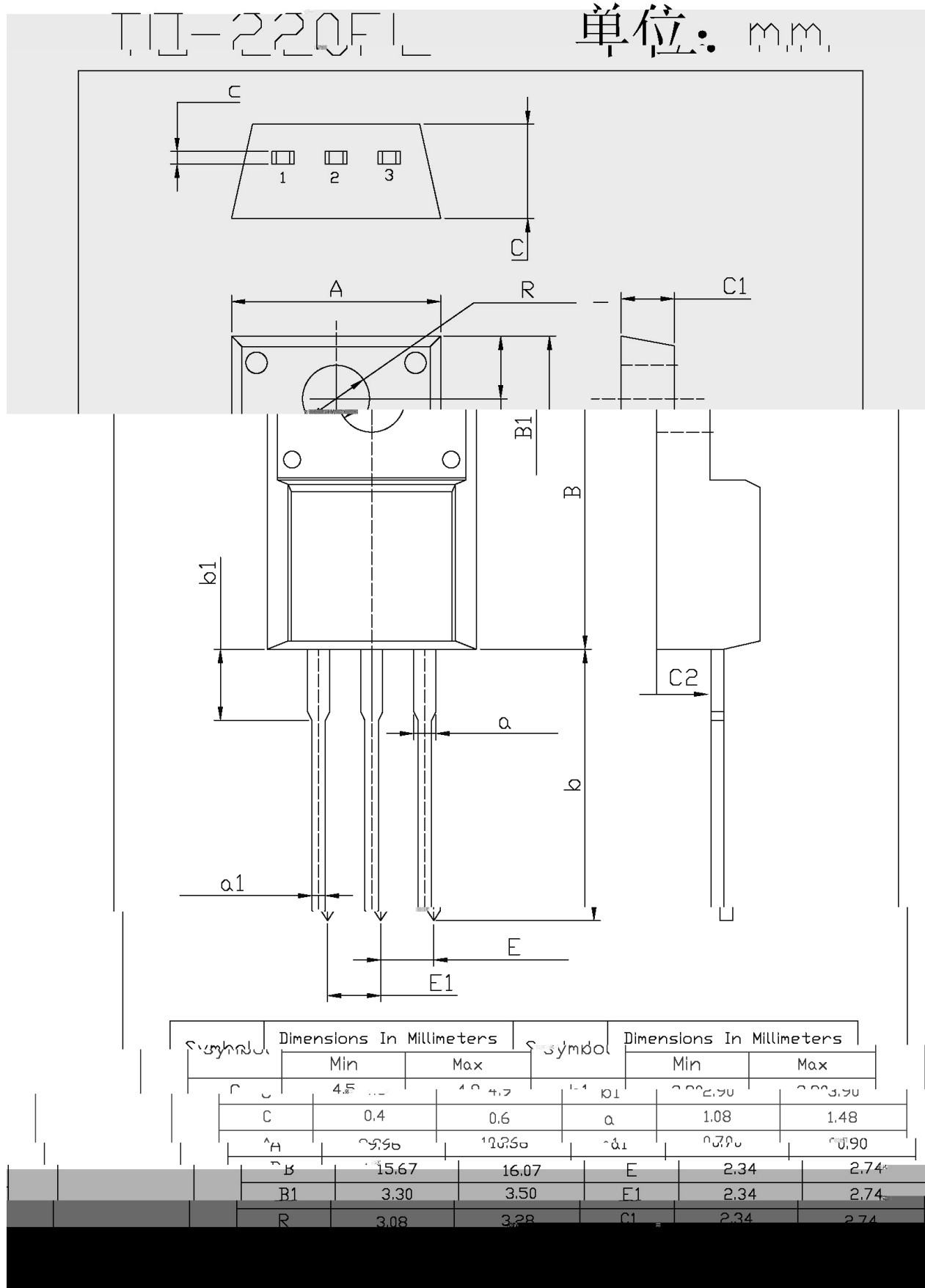
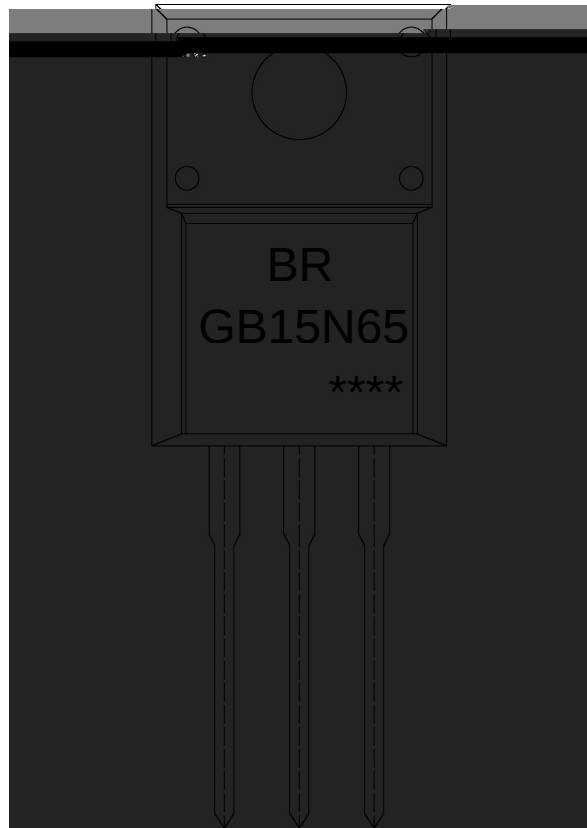


Figure.19 Typical Diode Forward Current vs Forward Voltage





BR

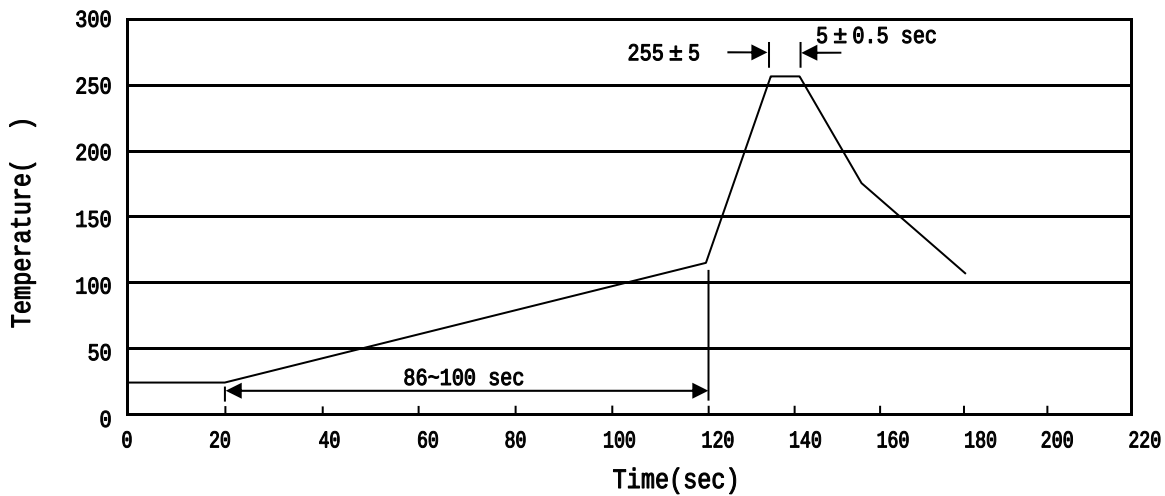
GB15N65

Note:

BR: Company Code

GB15NN65: Product Type Code

****: Lot No. Code, code change with Lot No



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.

270±5

10±1 sec.

Temp.:270±5

Time:10±1 sec

/ TUBE

Package Type	Units					Dimension (unit mm ³)		
	Units/Tube /	Tubes/Inner Box /	Units/Inner Box /	Inner Boxes/Outer Box /	Units/Outer Box /	Tube	Inner Box	Outer Box
TO-220FL	50	20	1,000	5	5,000	532×33×7.0	555×164×50	575×290×180