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TO-220FL N 650V

N-CHANNEL 650V Super-Junction Power MOSFET in a TO-220FL Plastic Package.

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$R_{DS(on)}$×Qg 100% ROHS

Very low $R_{DS(on)}$×Qg,100% avalanche tested,RoHS compliant,HF Product.

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For switch mode power supply, uninterruptible power supply, power factor correction.

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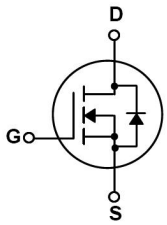

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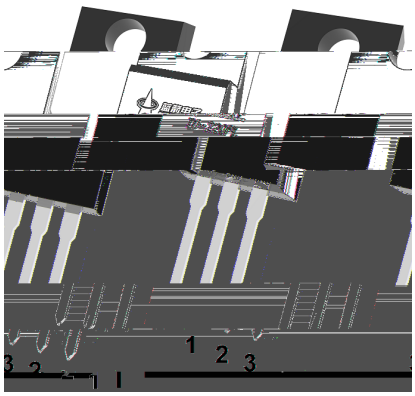

PIN1 G PIN 2 D PIN 3 S

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See Marking Instructions.

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Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	650	V
Drain Current	I_D(Tc=25)	8.5	A
Drain Current - Pulsed	I_{DM}	34	A
Gate-Source Voltage	V_{GS}	±30	V
Single Pulsed Avalanche Energy	E_{AS}	86.7	mJ
Avalanche Current	I_{AS}	4	A
Power Dissipation	P_D(Tc=25)	27	W
Operating and Storage Temperature Range	T_J,T_{STG}	-55 to 150	
Junction-to-Case	$R_{\theta JC}$	4.6	/W
Junction-to-Ambient	$R_{\theta JA}$	65	/W

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Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	650			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V V_{GS}=0V T_J=25			1.0	μA
Gate-Body Leakage Current, Forward	I_{GSS}	V_{GS}=±30V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=250μA	2.5		4.0	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V I_D=3.5A		580	650	mΩ
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V I_{SD}=1A T_J=25			1.2	V
Gate Resistance	R_g	V_{GS} = 0V f = 1.0MHz		14.3		Ω
Input Capacitance	C_{iss}	V_{DS}=100V V_{GS}=0V f=1.0MHz		308		pF
Output Capacitance	C_{oss}			560		pF
Reverse Transfer Capacitance	C_{rss}			9.8		pF
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=400V I_D=3.5A V_{GS}=10V R_G=25Ω		33.9		ns
Turn-On Rise Time	t_r			23.4		ns
Turn-Off Delay Time	$t_{d(off)}$			50.3		ns
Turn-Off Fall Time	t_f			20.3		ns

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Continuous Diode Forward Current	I_S				8.5	A
Total Gate Charge	Q_g	V_{DS}=520V I_D=3.5A V_{GS}=10V		11.5		nC
Gate-Source Charge	Q_{gs}			2.7		nC
Gate-Drain Charge	Q_{gd}			2.1		nC
Reverse recovery time	T_{rr}	V_R=50 V, I_F=3.5A, dI_F/dt=100 A/μs		174		ns
Reverse recovery charge	Q_{rr}			1.3		uC

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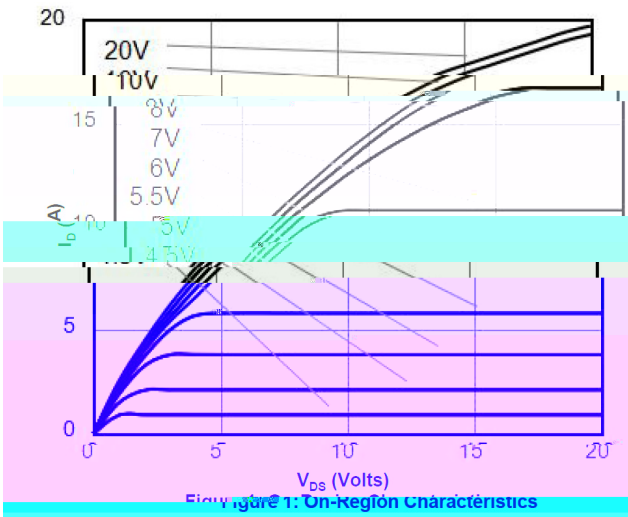


Figure 1: On-Region Characteristics

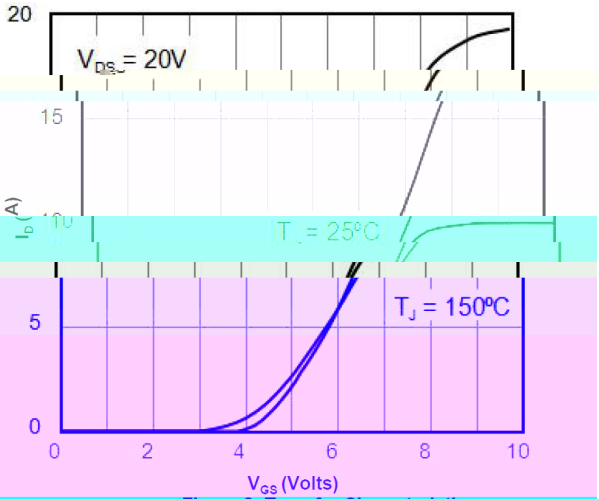
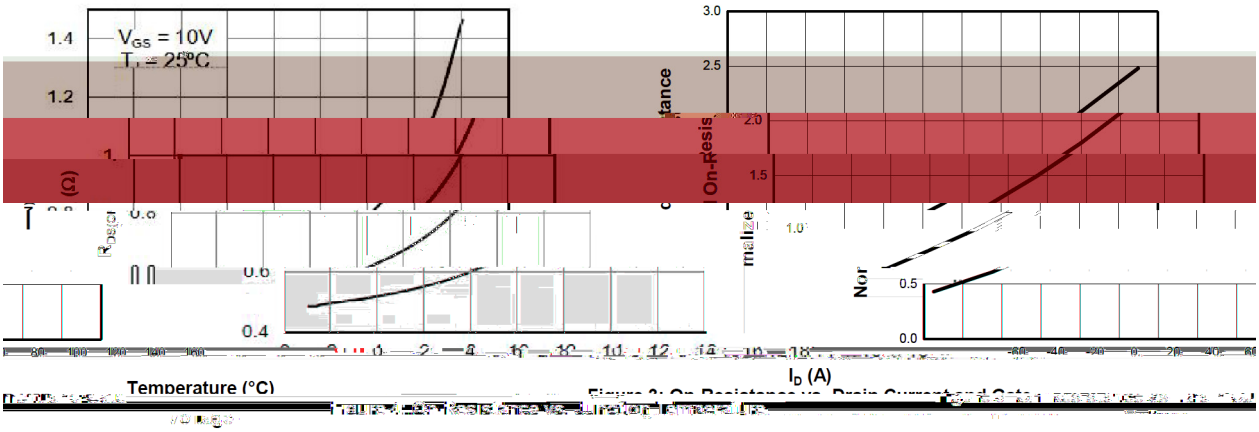


Figure 2: Transfer Characteristics



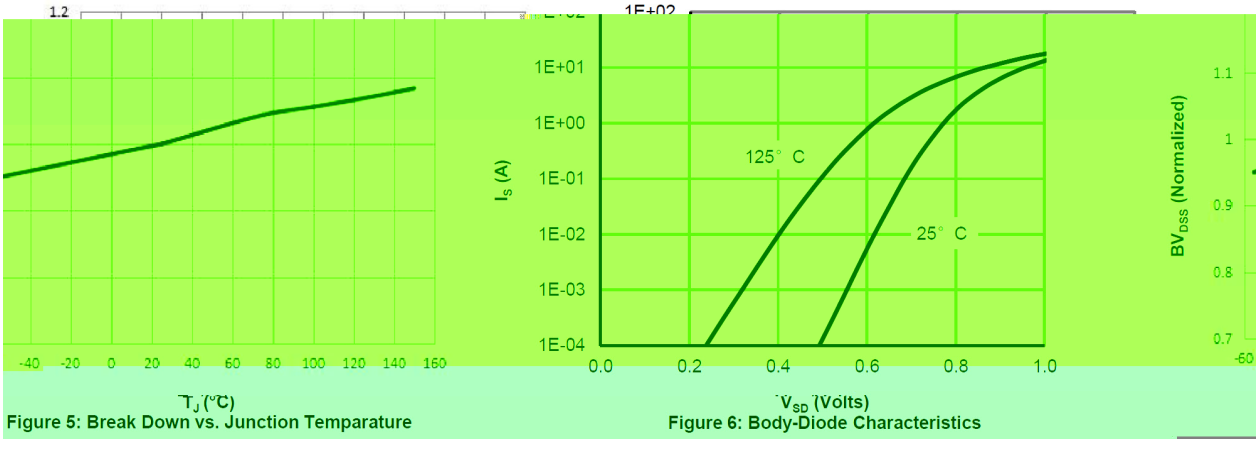


Figure 5: Break Down vs. Junction Temparature

Figure 6: Body-Diode Characteristics

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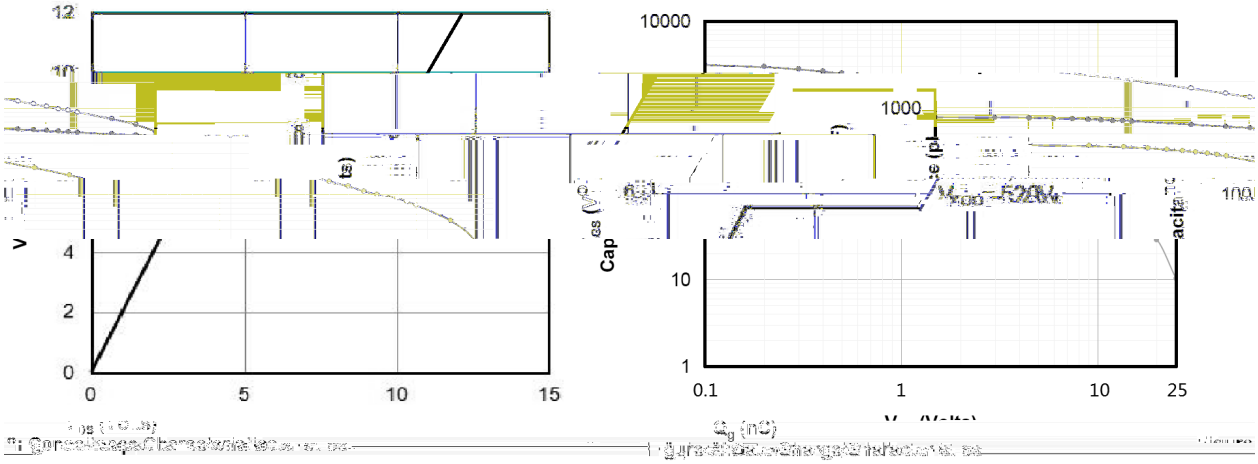
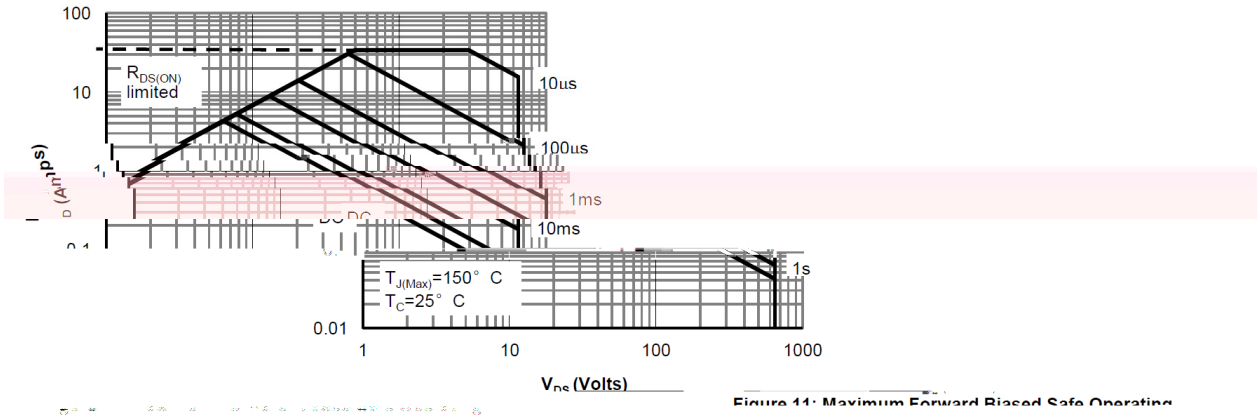
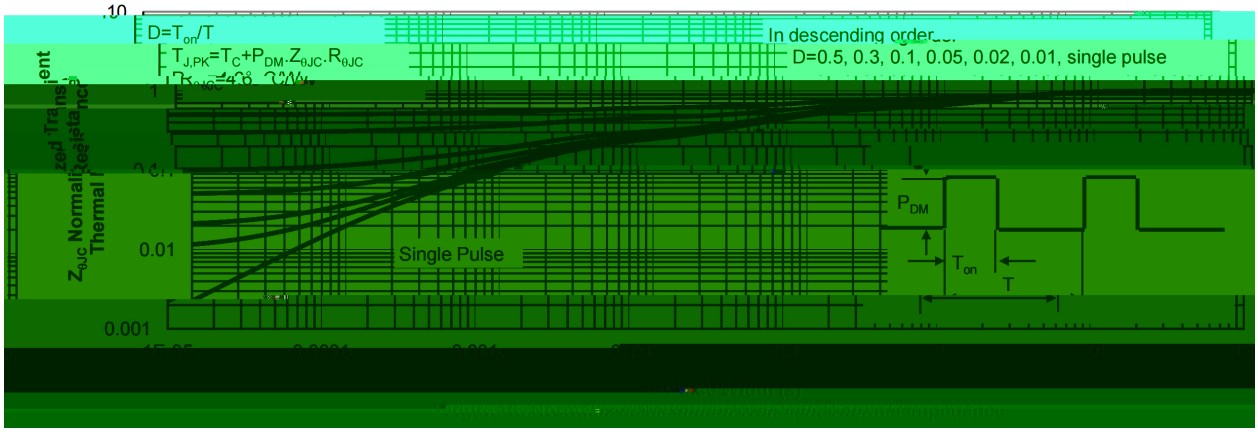

12
10
4
2
0
0
5
10
15
10000
1000
100
10
1
0.1
1
10
25


100
10
1
0.1
0.01
1
10
100
1000
R_DS(ON) limited
10μs
100μs
1ms
10ms
1s
T_J(Max)=150° C
T_C=25° C
V_DS (Volts)

Area


D=T_on/T
T_J,PK=T_C+P_DM.Z_θJC.R_θJC
In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse
Z_θJC Normalized Transient Thermal Resistance
0.01
0.001
Single Pulse
P_DM
T_on
T

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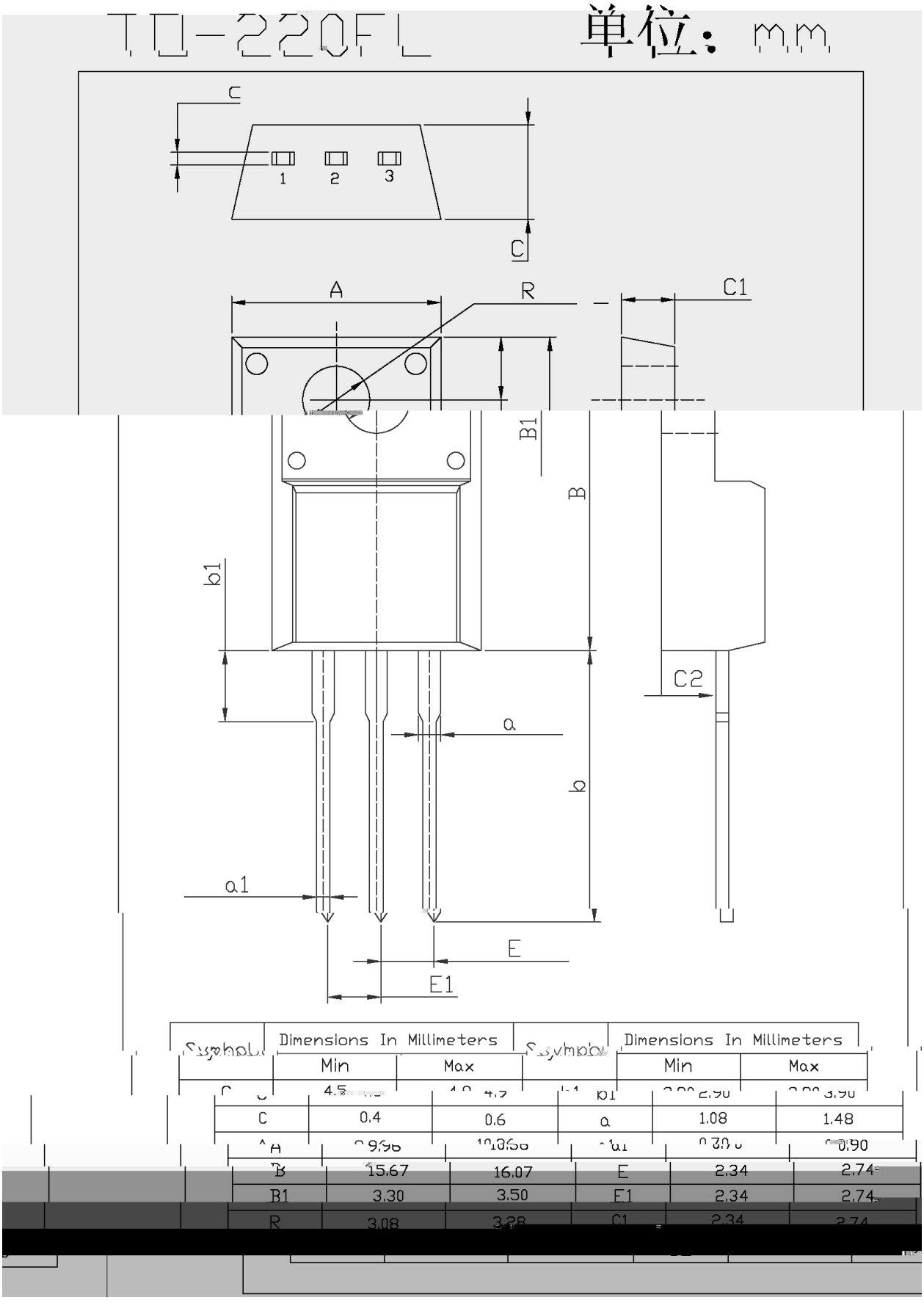

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
C	0.4	0.6	a	1.08	1.48
A	9.96	10.36	a1	0.70	0.90
B	15.67	16.07	E	2.34	2.74
B1	3.30	3.50	E1	2.34	2.74
R	3.08	3.28	C1	2.34	2.74

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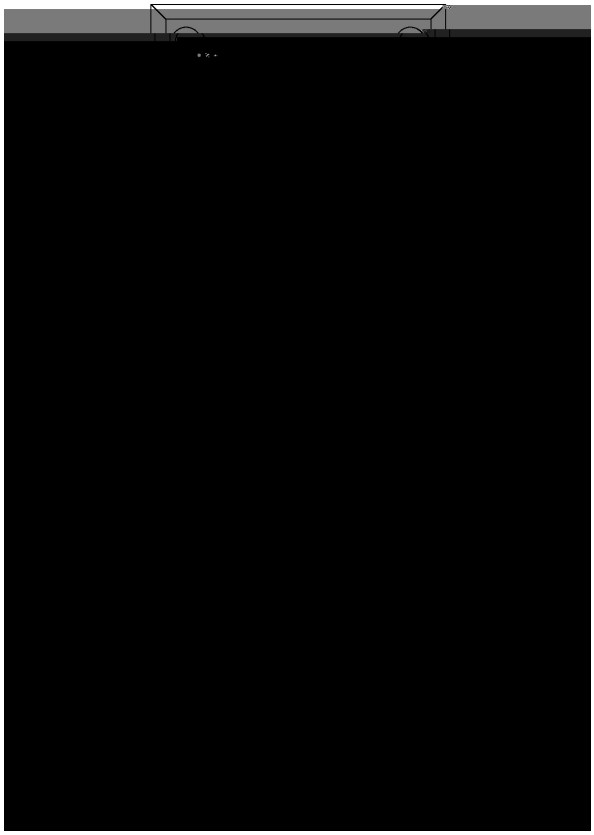

BR

65R650T

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Note:

BR:	Company Code
65R650T:	Product Type Code
****:	Lot No. Code, code change with Lot No

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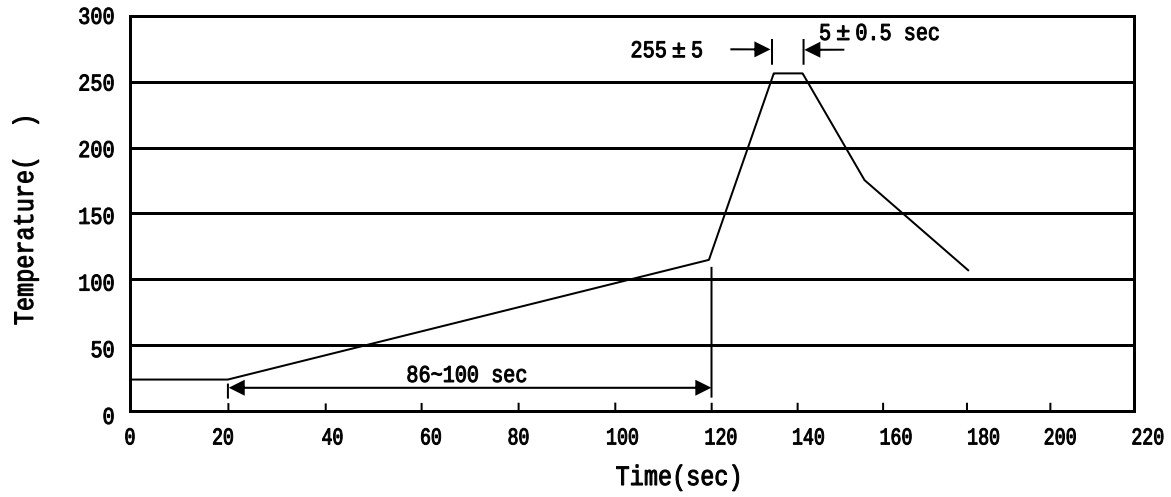

Note:

1		25	150	60	90sec;
2		255±5			5±0.5sec;
3			2	10	/sec.

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

2.Peak Temp.:255±5 , Duration:5±0.5sec.

3. Cooling Speed: 2~10 /sec.

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

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Package Type	Units					Dimension (unit mm³)		
	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

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