

BRCS030N04RA

Rev.A May.-2023

/ Descriptions

TO-220 N

N-CHANNEL MOSFET in a TO-220 Plastic Package.

/ Features

$V_{DS}=40V$ $I_D=177A$ $V_{GS}=\pm 20V$

$R_{DS(on)}@10V \hat{=} 3.0m\Omega$ (Type.2.5m Ω)

$R_{DS(on)}@4.5V \hat{=} 5.0m\Omega$ (Type.3.5m Ω)

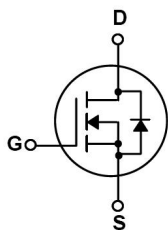
HF Product.

/ Applications

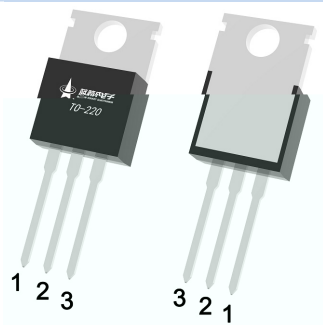
DC/DC

DC Motor Driver, Synchronous Rectification in DC/DC Converters.

/ Equivalent Circuit



/ Pinning



PIN1 G

PIN 2 4 D

PIN 3 S

/ Marking

See Marking Instructions.

/ Absolute Maximum Ratings(Ta=25)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	40	V
Drain Current		$I_D(T_c=25)$	177	A
Pulsed Drain Current		I_{DM}	560	A
Gate-Source Voltage		V_{GS}	± 20	V
Single Pulsed Avalanche Energy L=0.5mH		E_{AS}	435	mJ
Avalanche Current		I_{AS}	33	A
Total Power Dissipation		$P_D(T_c=25)$	170	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	
Thermal Resistance-Junction to Ambient	t 10s	R_{JA}	15	/W
	Steady-State		60	
Thermal Resistance-Junction to Case	Steady-State	R_{JC}	0.74	

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DS}	$V_{GS}=0V$ $I_D=250\mu A$	40	47		V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=40V$ $V_{GS}=0V$			1	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 20V$ $V_{DS}=0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	1	1.7	3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V$ $I_D=20A$		2.5	3	$m\Omega$
		$V_{GS}=4.5V$ $I_D=10A$		3.5	5	
Forward On Voltage	V_{SD}	$V_{GS}=0V$ $I_S=1A$			1.2	V
Gate resistance	R_g	$V_{GS}=0V$ $V_{DS}=0V$, $f=1MHz$		1.3		Ω
Input Capacitance	C_{iss}	$V_{DS}=25V$ $V_{GS}=0V$ $f=1MHz$		9600		pF
Output Capacitance	C_{oss}			740		
Reverse Transfer Capacitance	C_{rss}			650		
Total Gate Charge	$Q_{g(10V)}$	$V_{GS}=10V$, $I_D=20A$ $V_{DS}=20V$		51		nC
Total Gate Charge	$Q_{g(4.5V)}$			23		
Gate Source Charge	Q_{gs}			13.2		
Gate Drain Charge	Q_{gd}			3.1		

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V$ $V_{DS}=20V$ $R_L=1$ $R_{GEN}=3$		11		ns
Turn-On Rise Time	t_r			11		
Turn-Off Delay Time	$t_{d(off)}$			40		
Turn-Off Fall Time	t_f			10		

/ Electrical Characteristic Curve

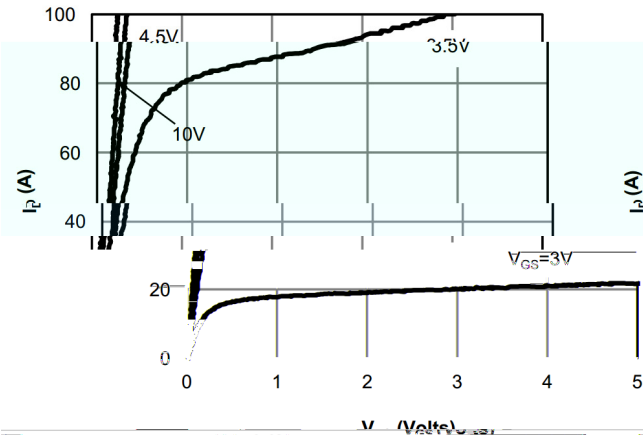


Figure 1: On-Region Characteristics

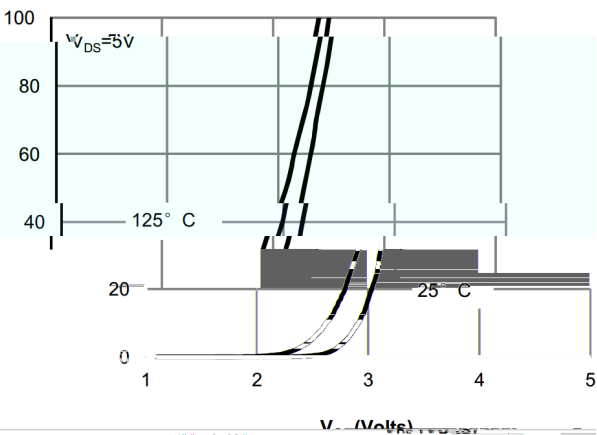


Figure 2: Transfer Characteristics

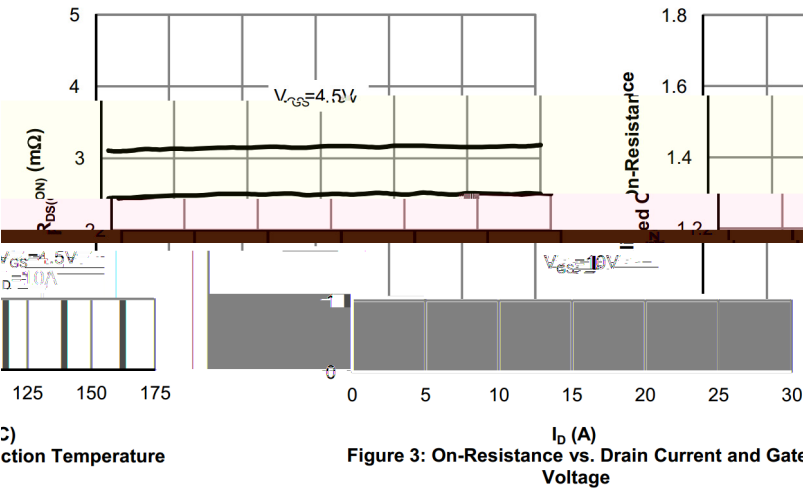


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

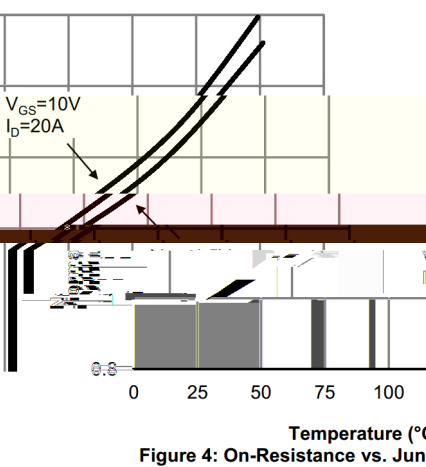
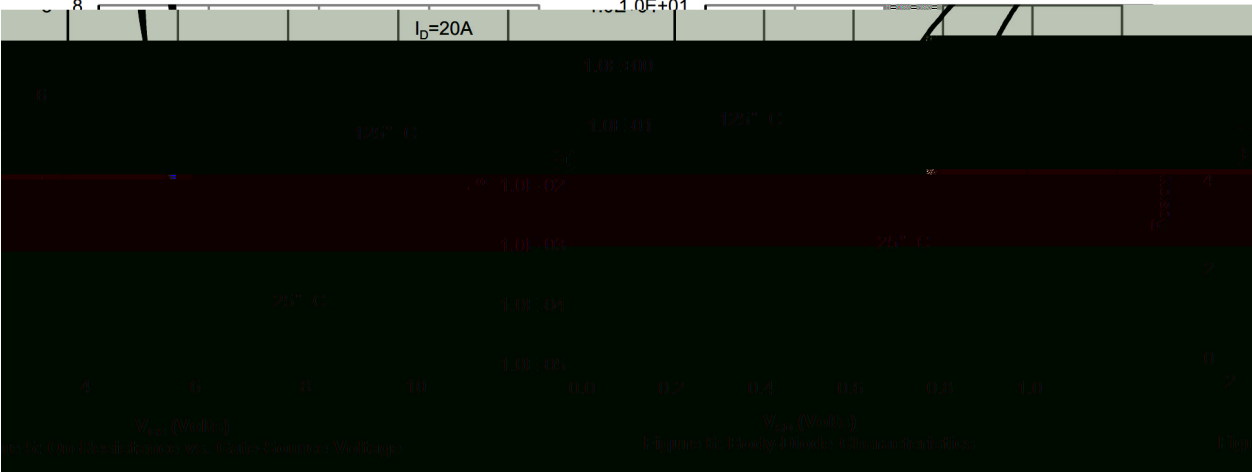


Figure 4: On-Resistance vs. Junction Temperature



/ Electrical Characteristic Curve

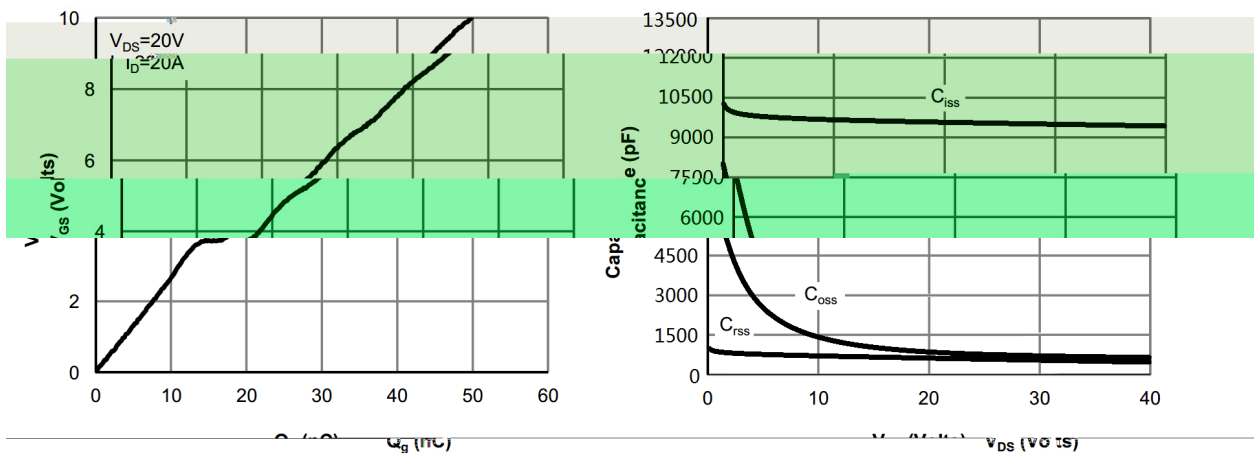


Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

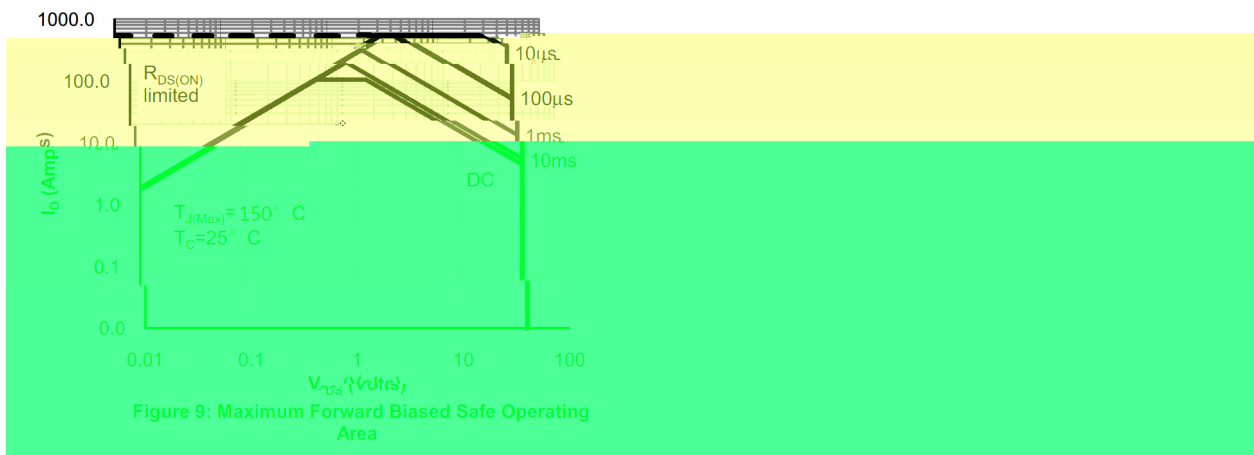


Figure 9: Maximum Forward Biased Safe Operating Area

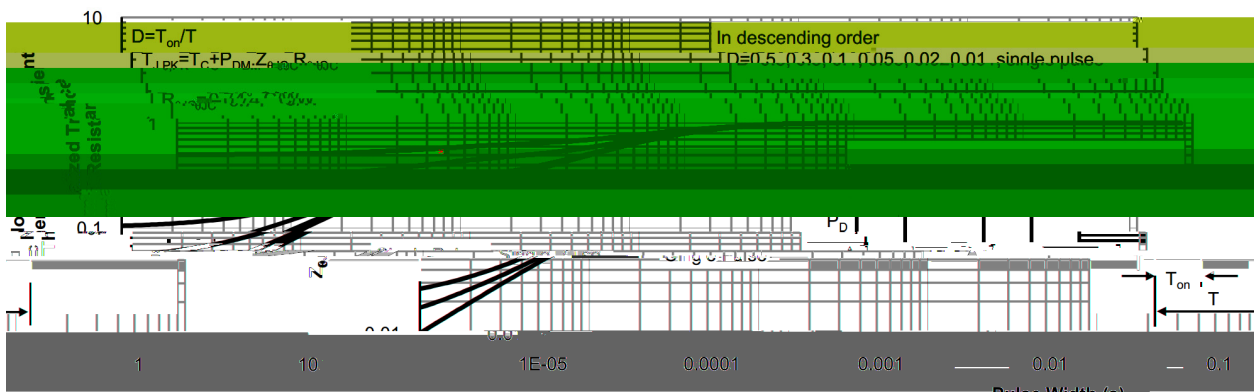
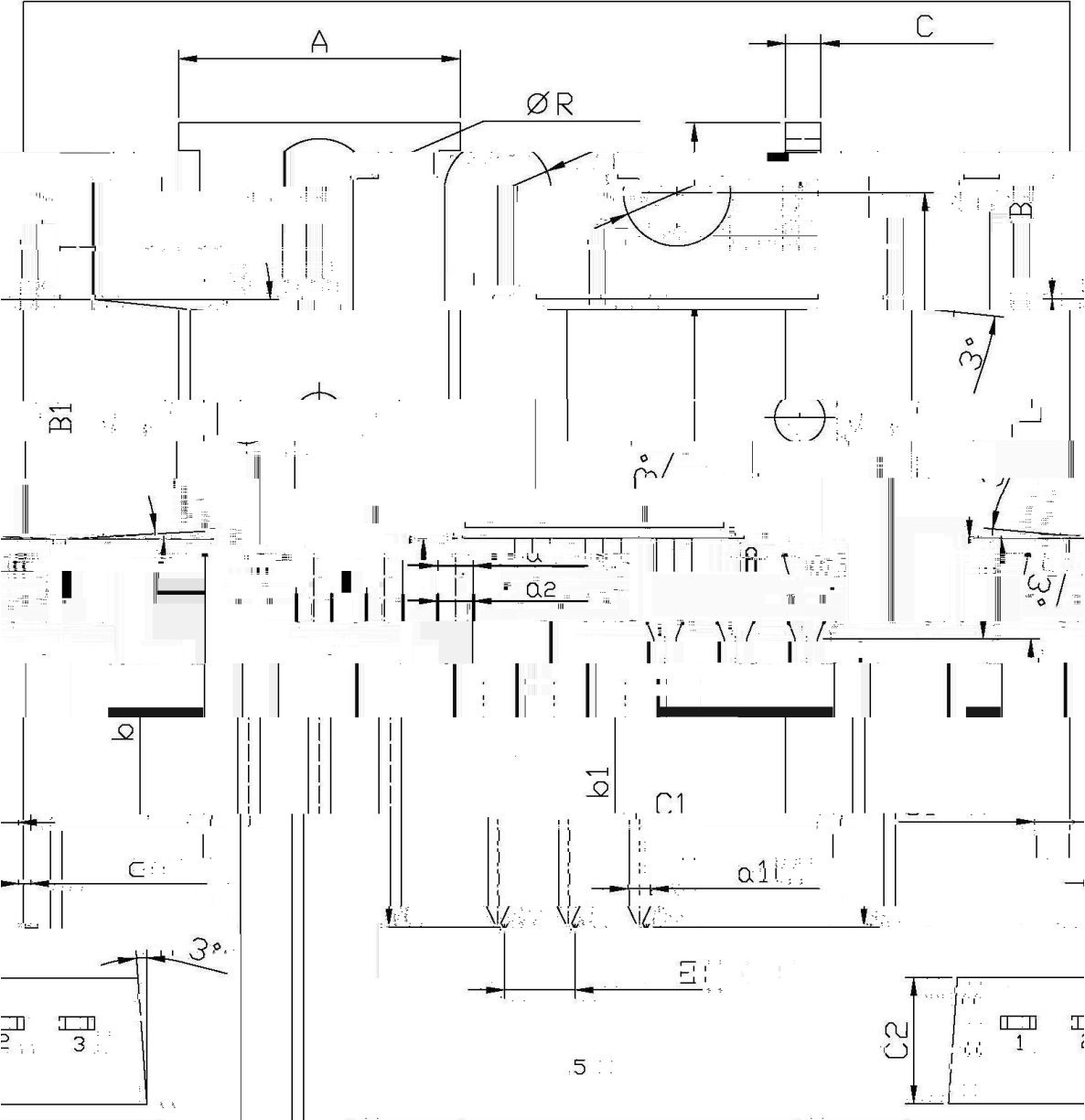


Figure 10: Normalized Maximum Transient Thermal Impedance

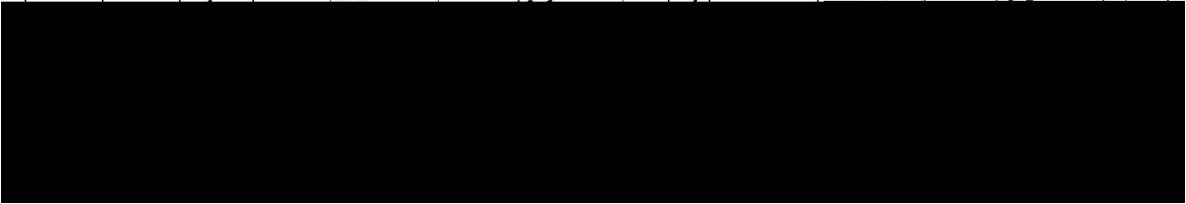
/ Package Dimensions

TO-220

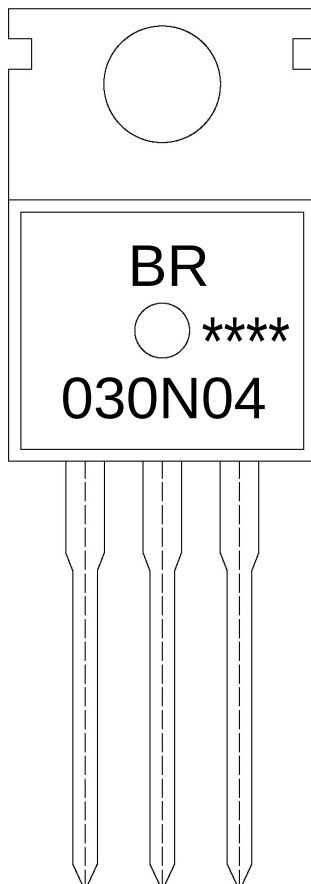
单位: mm



Dimensions In Millimeters			Dimensions In Millimeters		
Symbol	Min	Max	Symbol	Min	Max
A	9.8	10.2	C	1.2	1.4
R	3.56	3.64	B	6.3	6.7
L	15.7	16.1	B1	9.0	9.4
b	12.6	13.6	C1	2.2	2.6



/ Marking Instructions



BR

030N04

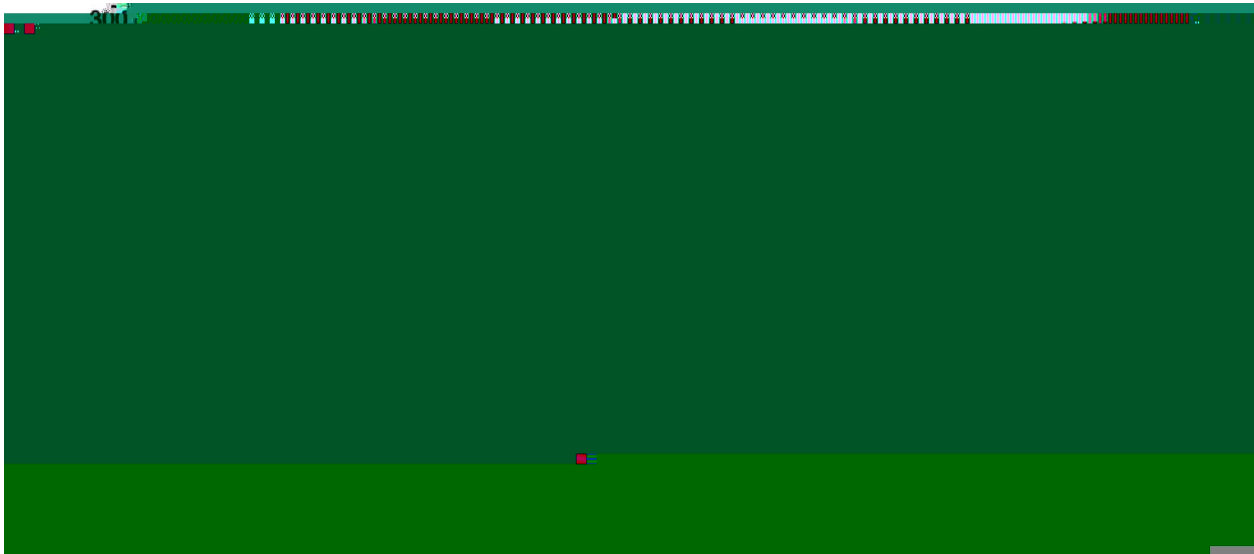
Note:

BR: Company Code

030N04: Product Type

****: 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.

/ BULK

Package Type	Units					Dimension (unit mm ³)		
	Units/Bag /	Bags/Inner Box /	Units/Inner Box /	Inner Boxes/Outer Box /	Units/Outer Box /	Bag	Inner Box	Outer Box
TO-220/F	200	10	2,000	5	10,000	135×190	237×172×102	560×245×195