/ Descriptions

N TO-251 N-CHANNEL MOSFET in a TO-251 Plastic Package.

/ Features

$R_{DS(on)}$ C_{rss}

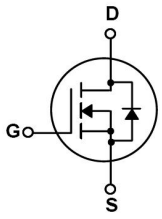
Low $R_{DS(on)}$,low gate charge, low C_{rss}, fast switching.

/ Applications

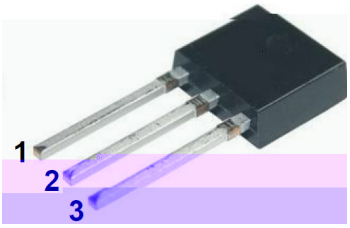
DC/DC

Suited for low voltage applications such as automotive, DC/DC Converters, and high efficiency switching for power management in portable and battery operated products.

/ Equivalent Circuit



/ Pinning



PIN1 G PIN 2 D PIN 3 S

/ h_{FE} Classifications & Marking

See Marking Instructions.

/ Absolute Maximum Ratings(Ta=25)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	20	V
Drain Current [G]	I_D(Tc=25℃)	30	A
	I_D(Tc=100℃)	20	A
Drain Current - Pulsed [C]	I_{DM}	120	A
Maximum Body-Diode Continuous Current [G]	I_S	30	A
Gate-Source Voltage	V_{GS}	±12	V
Avalanche Current [C]	I_{AS}	12	A
Avalanche energy L=0.5mH [C]	$E_{AS,}$	115	mJ
Power Dissipation [B]	P_D(Tc=25℃)	100	W
	P_D(Tc=100℃)	50	W
Power Dissipation [A]	P_{DSM}(T_A=25℃)	2.5	W
	P_{DSM}(T_A=70℃)	1.6	W
Junction and Storage Temperature Range	T_j, T_{stg}	-55～150	℃

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V V_{GS}=0V			1.0	μA
		T_J=55°C			5.0	μA
Gate-Body Leakage Current Forward	I_{GSS}	V_{GS}=±12V V_{DS}=0V			±0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=250μA	0.4	1.0	1.2	V
Static Drain-Source On-Resistance	$R_{DS(on)1}$	V_{GS}=10V I_D=30A		10	13	mΩ
	$R_{DS(on)2}$	V_{GS}=4.5V I_D=15A		11	14	mΩ
Diode Forward Voltage	V_{SD}	I_S=30A V_{GS}=0V		0.9	1.35	V

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Capacitance	C_{iss}	V_{DS}=25V V_{GS}=0V f=1.0MHz		884		pF
Output Capacitance	C_{oss}			174		
Reverse Transfer Capacitance	C_{rss}			78		
Gate resistance	R_g	V_{GS}=0V V_{DS}=0V f=1MHz	0.6	1.4	2.1	Ω
Total Gate Charge	Q_g(4.5V)	V_{GS}=10V V_{DS}=10V I_D=20A	28	36	43	nC
Gate Source Charge	Q_{gs}			9		
Gate Drain Charge	Q_{gd}			12		
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=10V V_{DS}=10V R_L=0.5Ω R_{GEN}=3Ω		7		ns
Turn-On Rise Time	t_r			8		
Turn-Off Delay Time	$t_{d(off)}$			70		
Turn-Off Fall Time	t_f			18		
Body Diode Reverse Recovery Time	t_{rr}	I_F=20A dI/dt=500A/ms	13	17	20	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=20A dI/dt=500A/ms	29	36	43	nC
Maximum Junction-to-Ambient [A]	$R_{\theta JA}$	t≤10s		16	20	℃/W
Maximum Junction-to-Ambient [AD]		teady-State		41	50	℃/W
Maximum Junction-to-Case	$R_{\theta JC}$	teady-State		1.2	1.5	℃/W

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The Power dissipation PDSM is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

B. The power dissipation PD is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.

D. The RqJA is the sum of the thermal impedance from junction to case RqJC and case to ambient.

E. The static characteristics in Figures 1to6 are obtained using <300ms pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.

/ Electrical Characteristic Curve

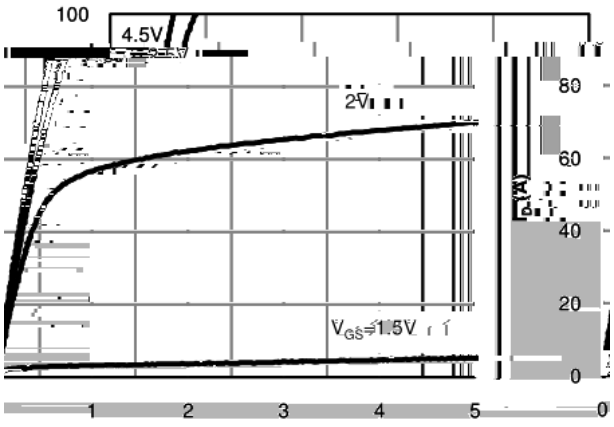


Fig 1: On-Region Characteristics

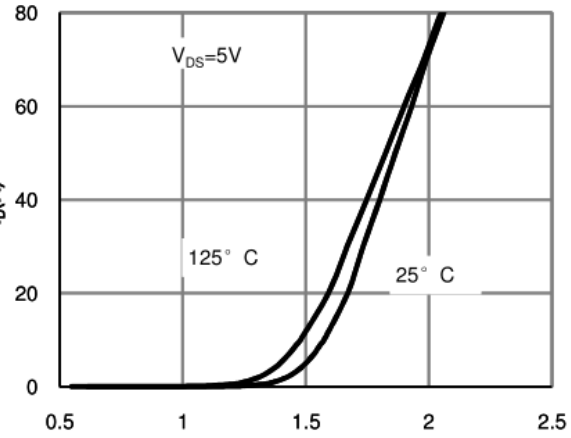


Figure 2: Transfer Characteristics

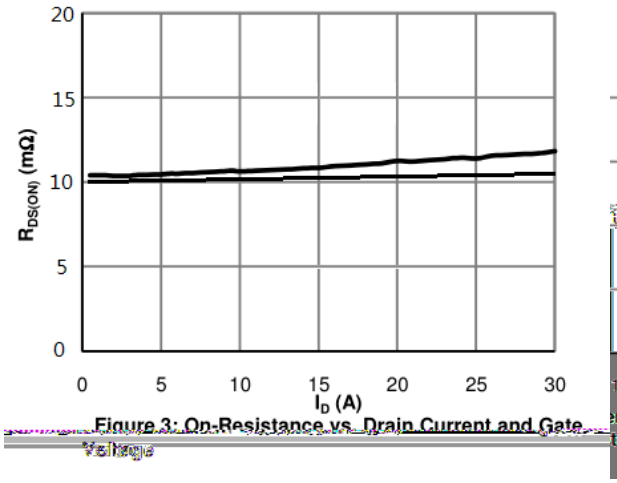


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

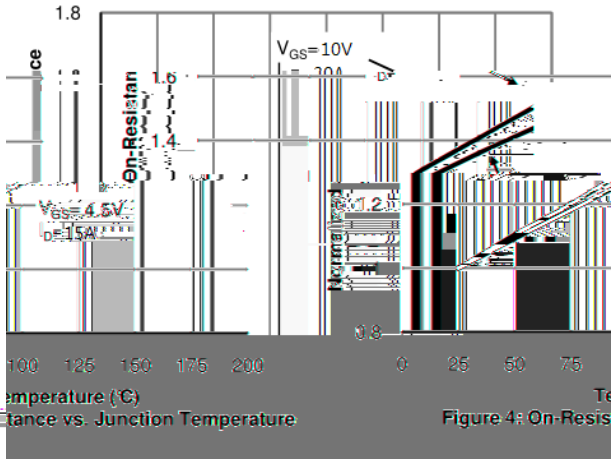


Figure 4: On-Resis

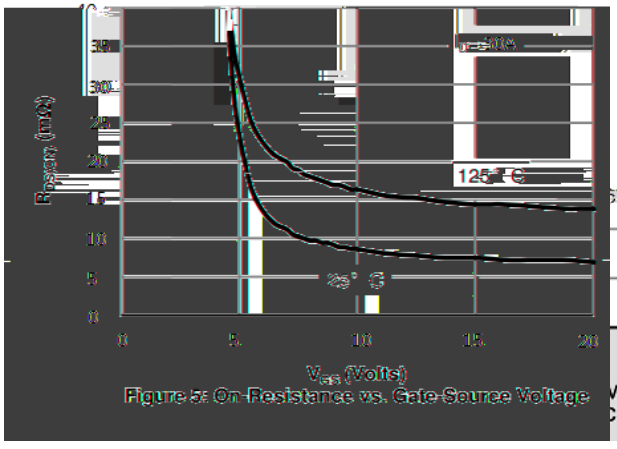


Figure 5: On-Resistance vs. Gate-Source Voltage

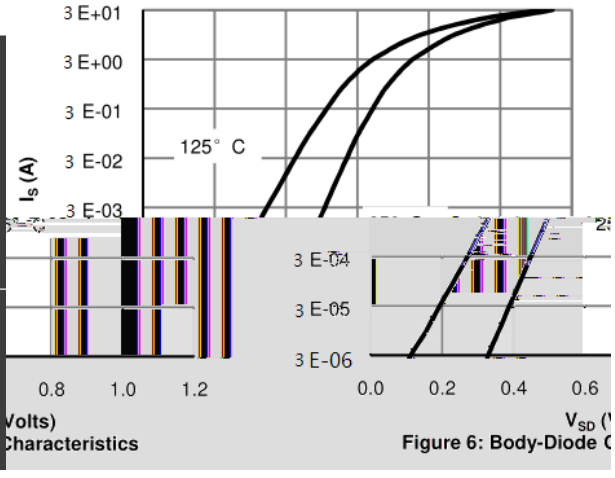


Figure 6: Body-Diode C

/ Electrical Characteristic Curve

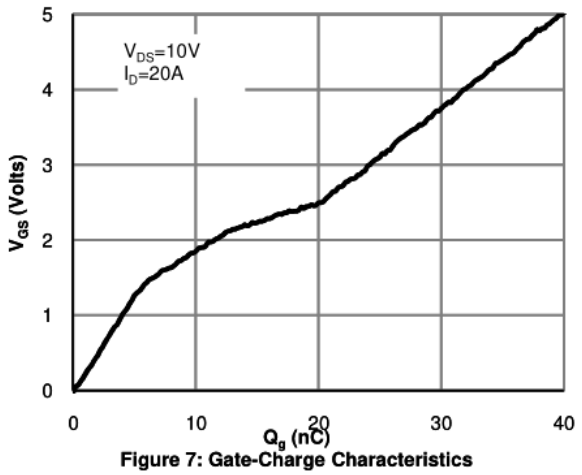


Figure 7: Gate-Charge Characteristics

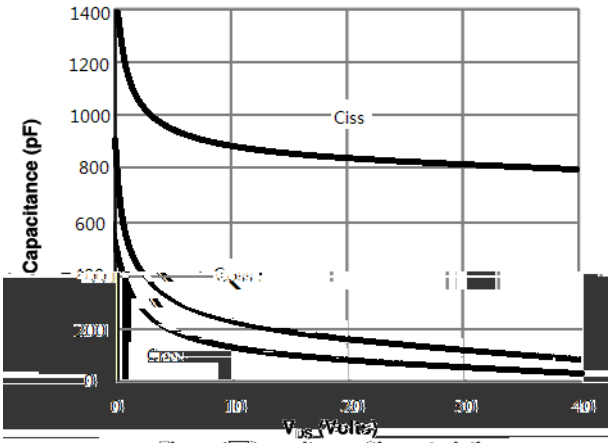


Figure 8: Capacitance Characteristics

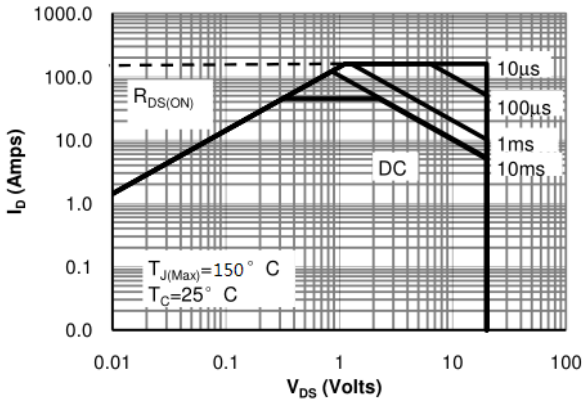


Figure 9: Maximum Forward Biased Safe Operating Area

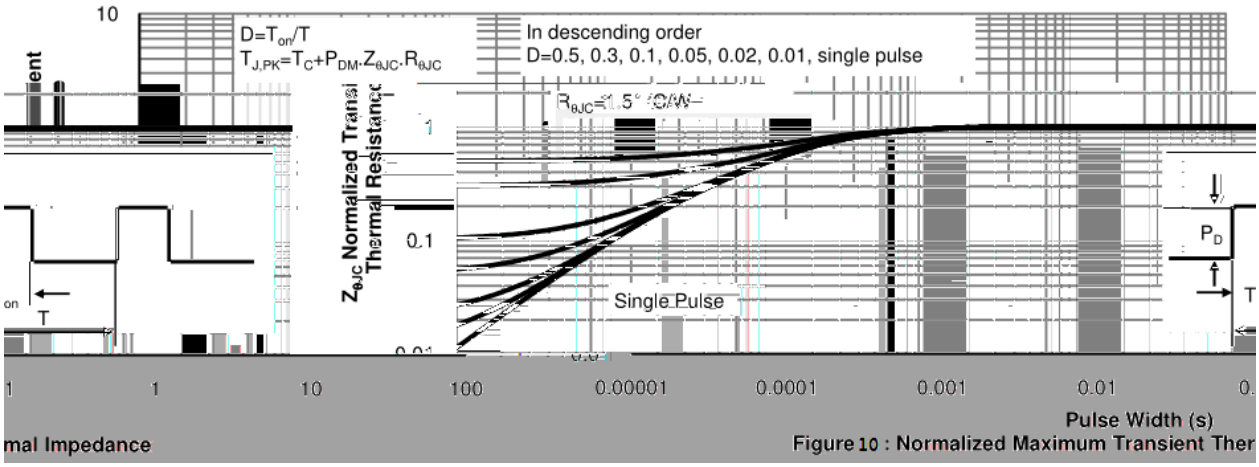
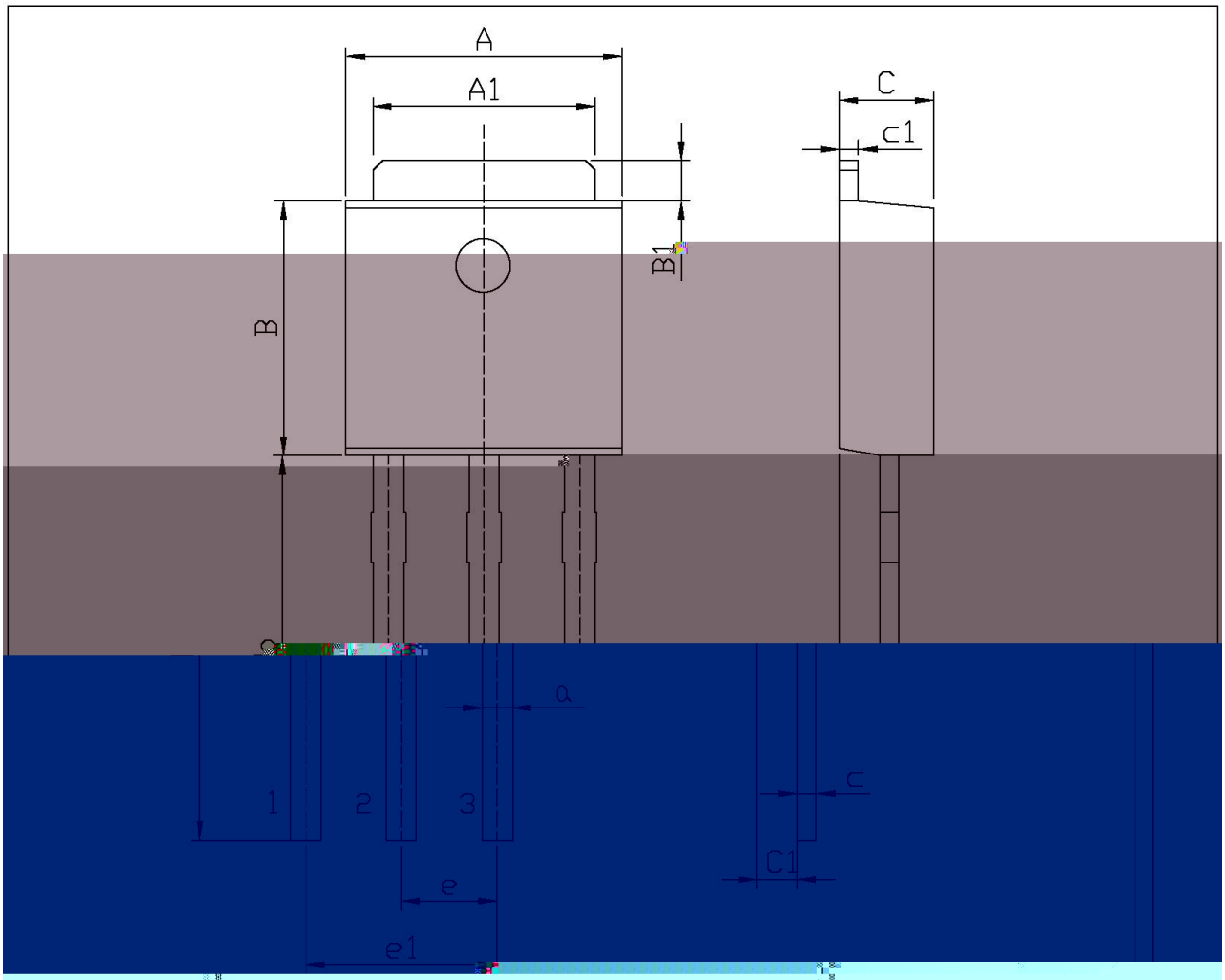


Figure 10 : Normalized Maximum Transient Thermal Impedance

/ Package Dimensions

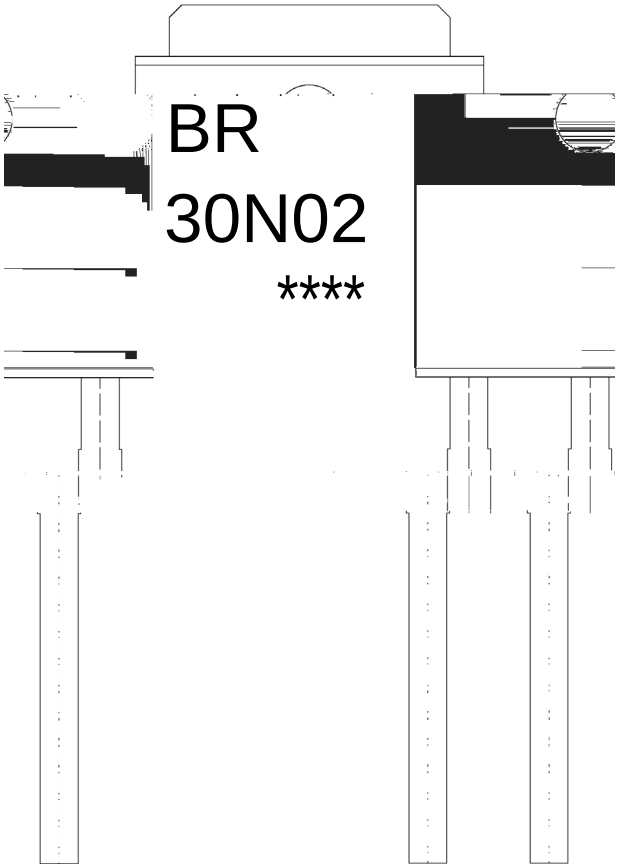


单位：mm

Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
Min	Max		Min	Max
6.45	6.75	a	0.50	0.70
5.10	5.50	b	9.00	9.40

Symbol
A
A1

/ Marking Instructions



BR

30N02

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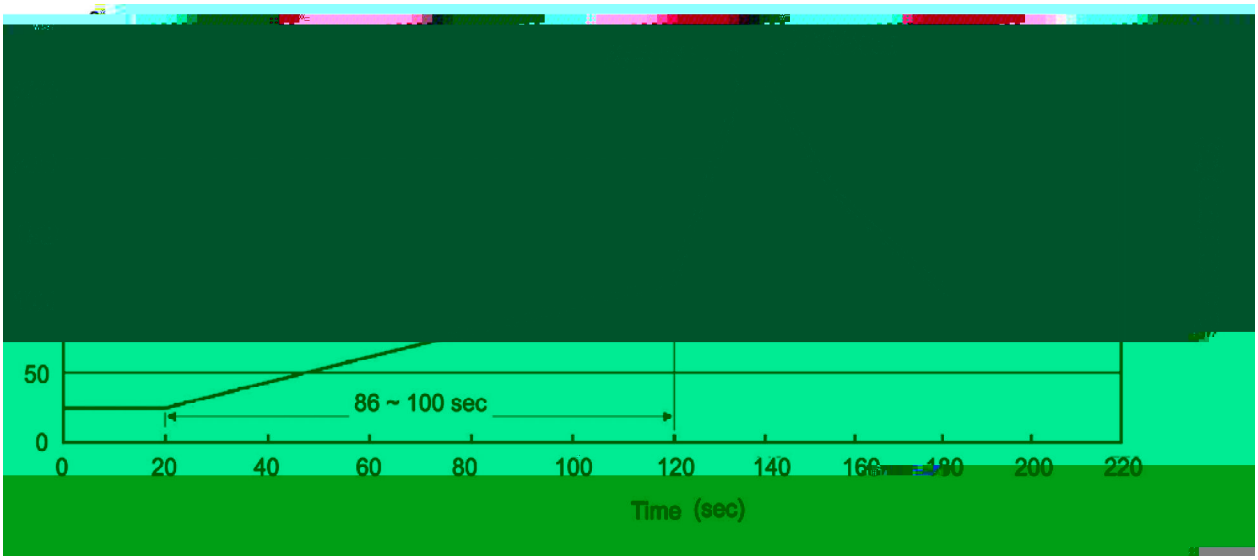
Note:

BR:	Company Code
30N02:	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.

/ REEL

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm³)		
	Units/Reel 只/卷盘	Reels/Inner Box 卷盘/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Reel	Inner Box 盒	Outer Box 箱
TO-251	1,000	10	10,000	5	50,000	135×190	237×172×102	560×245×195

/ TUBE

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm³)		
	Units/Tube 只/套管	Tubes/Inner Box 套管/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 只/箱	Tube 套管	Inner Box 盒	Outer Box 箱
TO-251/252	75	48	3,600	5	18,000	526×20.5×5.25	555×164×50	575×290×180

/ Notices