

/ Descriptions

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

/ Features

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

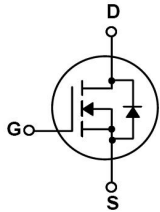
Low $R_{DS(on)}$, low gate charge, low C_{rss} , fast switching.

/ Applications

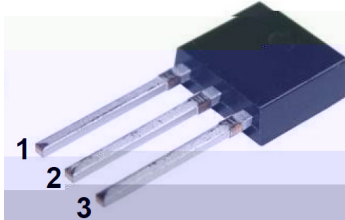
DC/DC

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	$I_D(T_C=25^{\circ}C)$	30	A
	$I_D(T_C=100^{\circ}C)$	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	$P_D(T_C=25^{\circ}C)$	100	W
	$P_D(T_C=100^{\circ}C)$	50	W
Power Dissipation ^A	$P_{DSM}(T_A=25^{\circ}C)$	2.5	W
	$P_{DSM}(T_A=70^{\circ}C)$	1.6	W
Junction and Storage Temperature Range	T_J, T_{stg}	-55~150	$^{\circ}C$

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V$ $I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V$ $V_{GS}=0V$			1.0	μA
		$T_J=55^{\circ}C$			5.0	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 12V$ $V_{DS}=0V$			± 0.1	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	0.4	1.0	1.2	V
Static Drain-Source On-Resistance	$R_{DS(on)1}$	$V_{GS}=10V$ $I_D=30A$		10	13	m Ω
	$R_{DS(on)2}$	$V_{GS}=4.5V$ $I_D=15A$		11	14	m Ω
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	$t_{d(on)}$	$V_{GS}=10V$ $V_{DS}=10V$ $R_L=0.5\Omega$ $R_{GEN}=3\Omega$		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	$R_{\theta JA}$	$t \leq 10s$		16	20	$^{\circ}C/W$
Maximum Junction-to-Ambient ^{AD}		steady-State		41	50	$^{\circ}C/W$
Maximum Junction-to-Case	$R_{\theta JC}$	steady-State		1.2	1.5	$^{\circ}C/W$

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}C$. The Power dissipation PDSM is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150 $^{\circ}C$. The value in any given application depends on the user's specific board design, and the maximum temperature of 150 $^{\circ}C$ may be used if the PCB allows it.

B. The power dissipation PD is based on $T_{J(MAX)}=150^{\circ}C$, 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 $T_{J(MAX)}=150^{\circ}C$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^{\circ}C$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

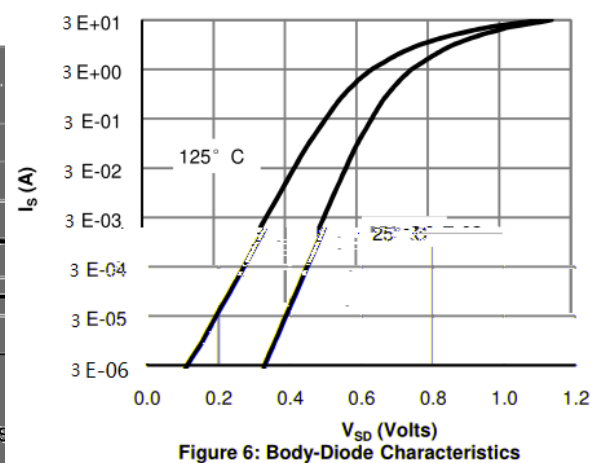
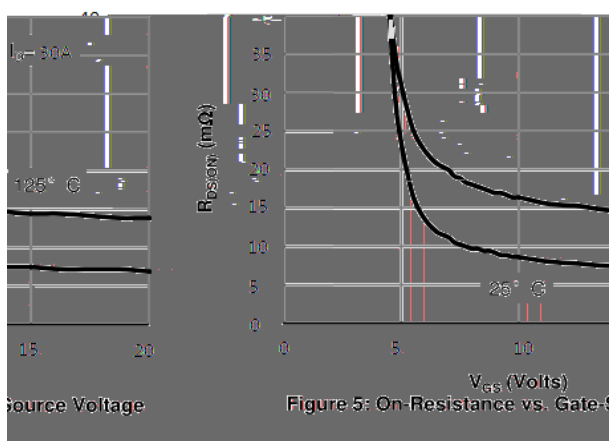
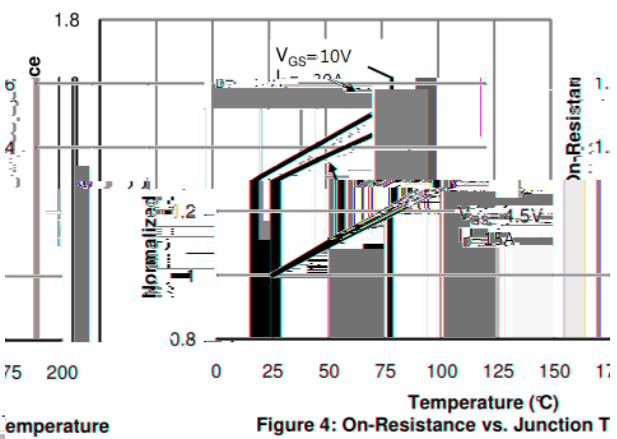
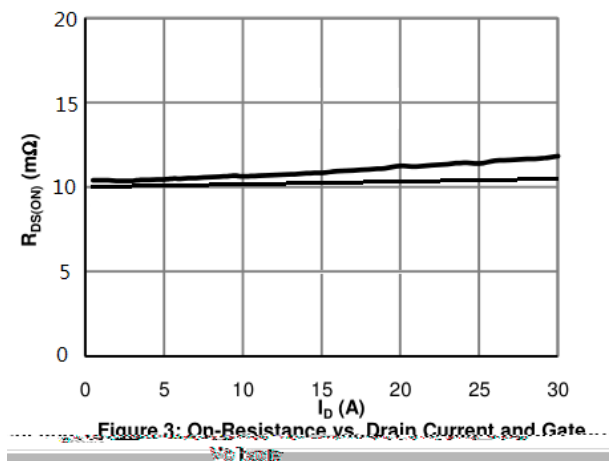
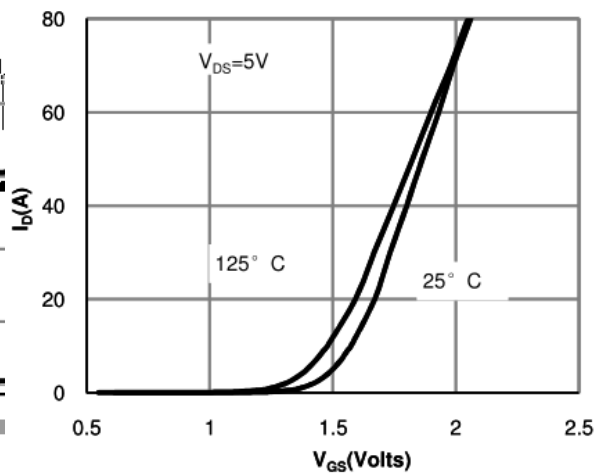
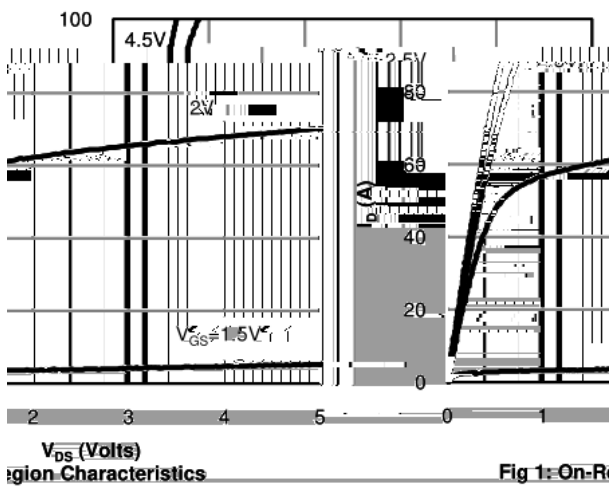
E. The static characteristics in Figures 1to6 are obtained using <300ms pulses, duty cycle 0.5% max.

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 $T_{J(MAX)}=150^{\circ}C$. The SOA curve provides a single pulse rating.

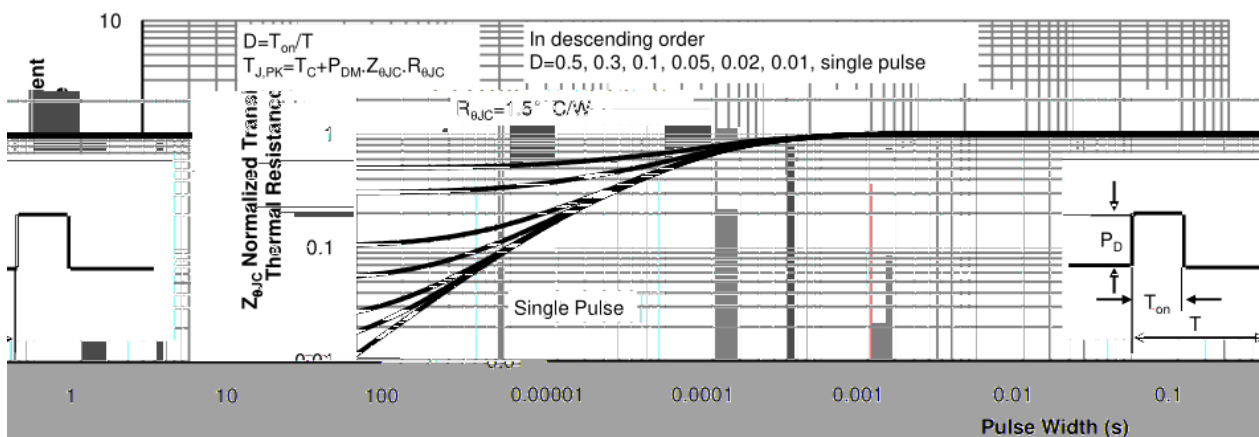
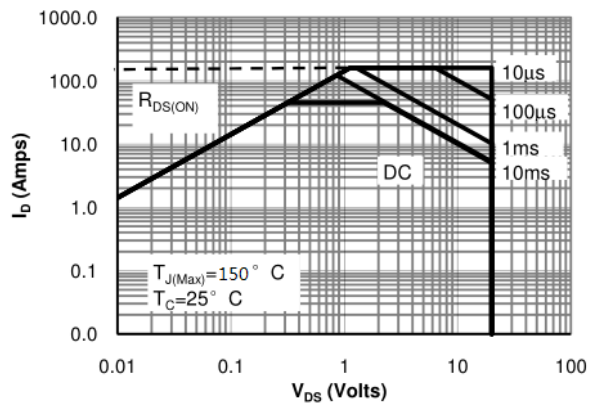
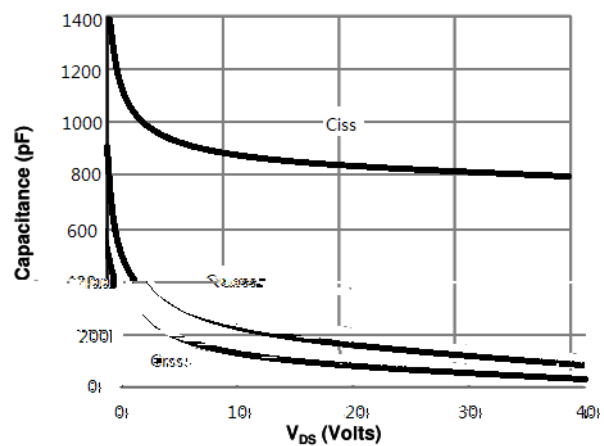
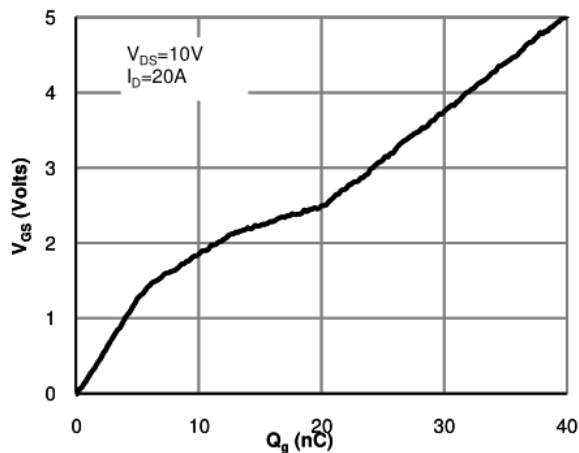
G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}C$.

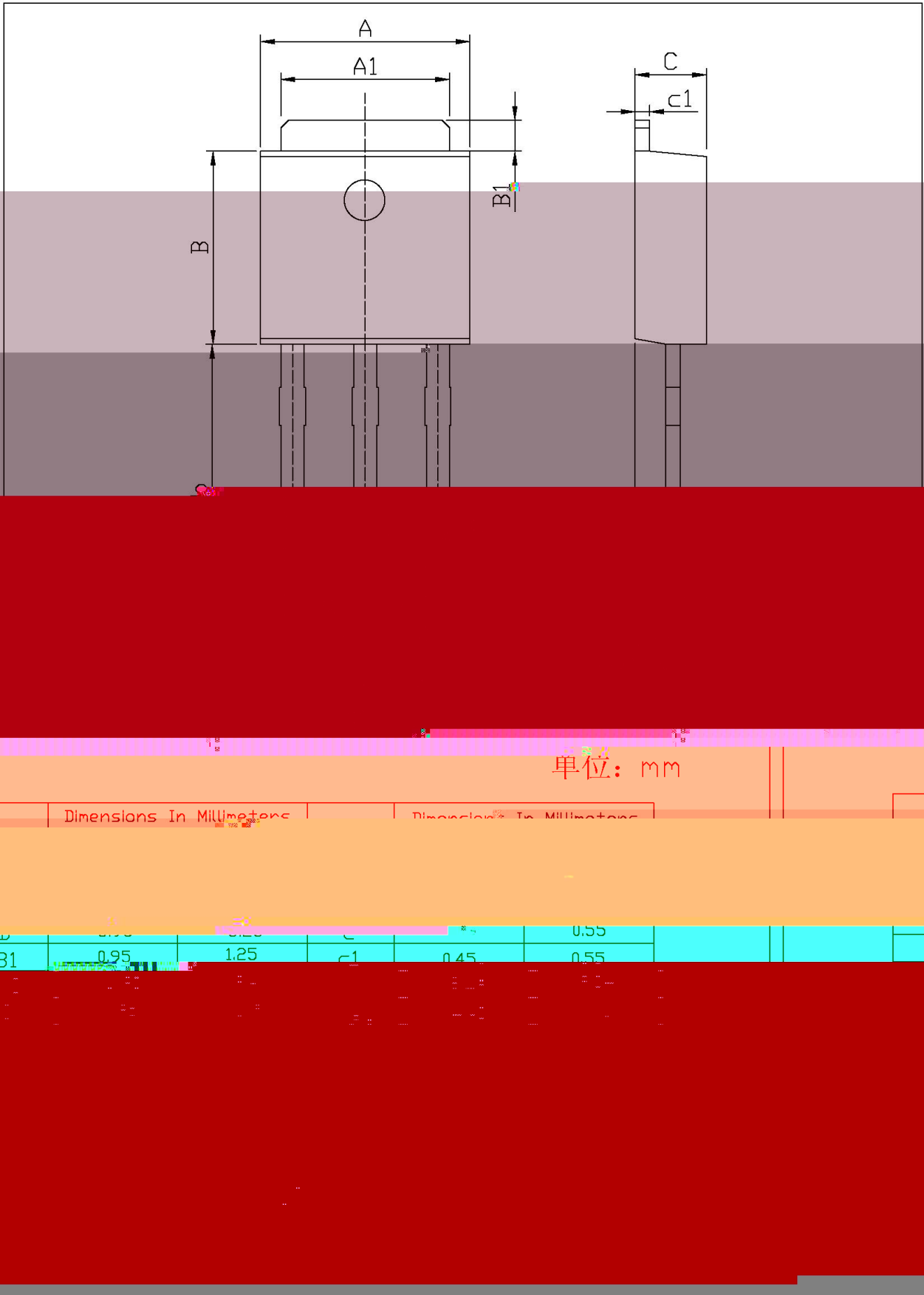
/ Electrical Characteristic Curve



/ Electrical Characteristic Curve

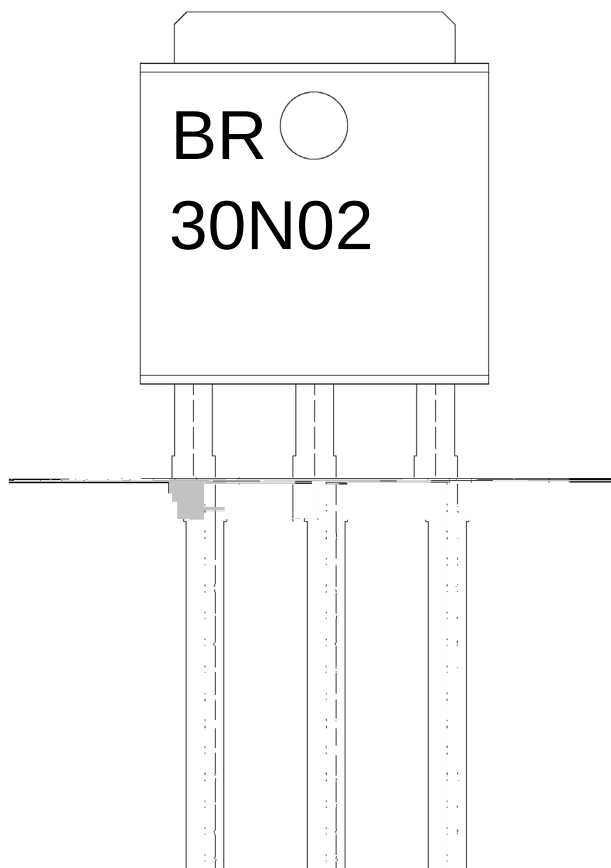


/ Package Dimensions





/ Marking Instructions



BR

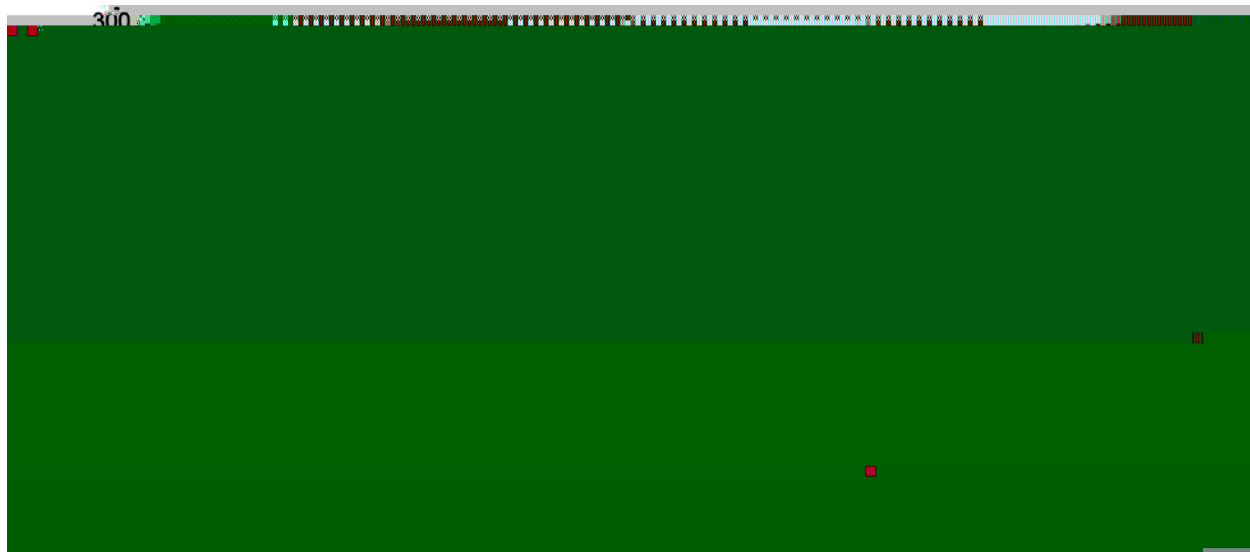
30N02

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
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/ Packaging SPEC.
/ REEL

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm ³)		
	只 卷盘	卷盘 盒	只 盒	盒 箱	只 箱		盒	箱

/ TUBE

Package Type 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm ³)		
	只 套管	套管 盒	只 盒	盒 箱	只 箱	套管	盒	箱

/ Notices