N-Channel Enhancement Mode Power MOSFET

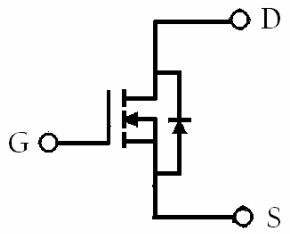
Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

BV_{DSS}	**200V**
I_D	**4.5A**
$R_{DS(ON)}$@V_{GS}=10V, I_D=2.9A	**650 mΩ(typ)**
$R_{DS(ON)}$@V_{GS}=7V, I_D=1A	**590 mΩ(typ)**

Symbol

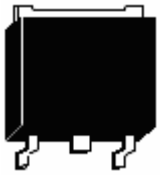
MTE2N20J3



G：Gate D：Drain S：Source

Outline

TO-252(DPAK)



G D S

Ordering Information

Device	Package	Shipping
MTE2N20J3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / tape& reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 2500 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (T_C=25°C)

Parameter			Symbol	Limits	Unit
Drain-Source Voltage (Note 1)			V_{DS}	200	V
Gate-Source Voltage			V_{GS}	±30	
Continuous Drain Current @T_C=25°C, V_{GS}=10V		(Note 1)	I_D	4.5	A
Continuous Drain Current @T_C=100°C, V_{GS}=10V		(Note 1)		2.8	
Continuous Drain Current @T_A=25°C, V_{GS}=10V		(Note 2)	I_{DSM}	1.2	
Continuous Drain Current @T_A=70°C, V_{GS}=10V		(Note 2)		0.9	
Pulsed Drain Current @ V_{GS}=10V		(Note 3)	I_{DM}	9	
Avalanche Current		(Note 3)	I_{AR}	2	
Single Pulse Avalanche Energy @ L=10mH, I_D=2A, V_{DD}=50V (Note 2)			E_{AS}	20	mJ
Repetitive Avalanche Energy		(Note 3)	E_{AR}	3.6	
Power Dissipation	T_C=25°C	(Note 1)	P_D	36	W
	T_C=100°C	(Note 1)		14	
	T_A=25°C	(Note 2)	P_{DSM}	2.5	
	T_A=70°C	(Note 2)		1.6	
Operating Junction and Storage Temperature			Tj, Tstg	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	3.5	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 2)	$R_{\theta JA}$	50	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 4)	$R_{\theta JA}$	110	°C/W

Note : 1.The power dissipation P_D 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.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. 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 175°C may be used if the PCB allows it.

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

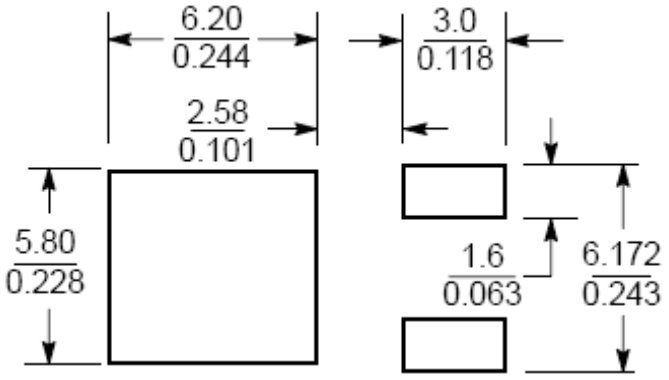
4. When mounted on the minimum pad size recommended (PCB mount), t≤10s.

Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	200	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.2	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	2.5	3.5	4.5	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	1	-	S	V_{DS} =40V, I_D=1A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V
I_{DSS}	-	-	10	μA	V_{DS} =200V, V_{GS} =0V
I_{DSS}	-	-	100		V_{DS} =160V, V_{GS} =0V, Tj=125°C
*$R_{DS(ON)}$	-	650	800	mΩ	V_{GS} =10V, I_D=2.9A
	-	590	730		V_{GS} =7V, I_D=1A
Dynamic					
*Qg	-	6.5	-	nC	V_{DD}=160V, I_D=4A,V_{GS}=10V
*Qgs	-	1.3	-		
*Qgd	-	3.3	-		
*$t_{d(ON)}$	-	9	-	ns	V_{DD}=100V, I_D=4A, V_{GS}=10V, R_G=25Ω
*tr	-	16	-		
*$t_{d(OFF)}$	-	15	-		
*t_f	-	13	-		
Ciss	-	232	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	25	-		
Crss	-	9.1	-		
Source-Drain Diode					
*I_S	-	-	2	A	
*I_{SM}	-	-	8		
*V_{SD}	-	0.77	1.2	V	I_S=1A, V_{GS}=0V
*trr	-	120	-	ns	V_{GS}=0, I_F=2A, dI/dt=100A/μs
*Qrr	-	500	-	nC	

*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

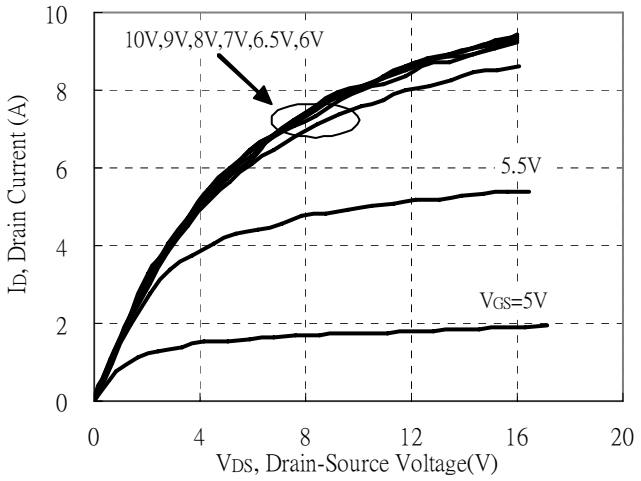
Recommended soldering footprint



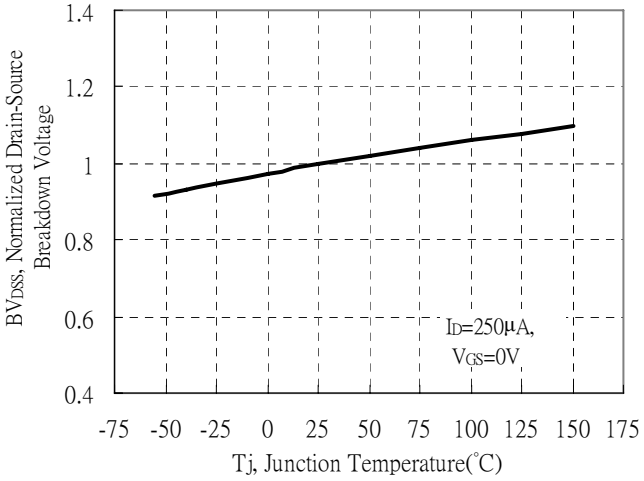
Unit (mm / inch)

Typical Characteristics

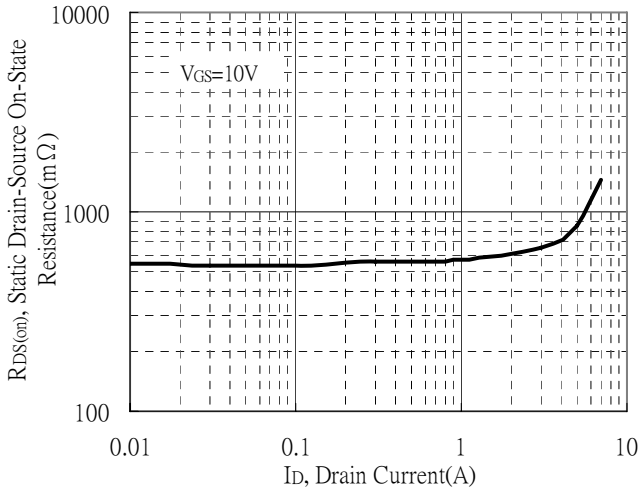
Typical Output Characteristics



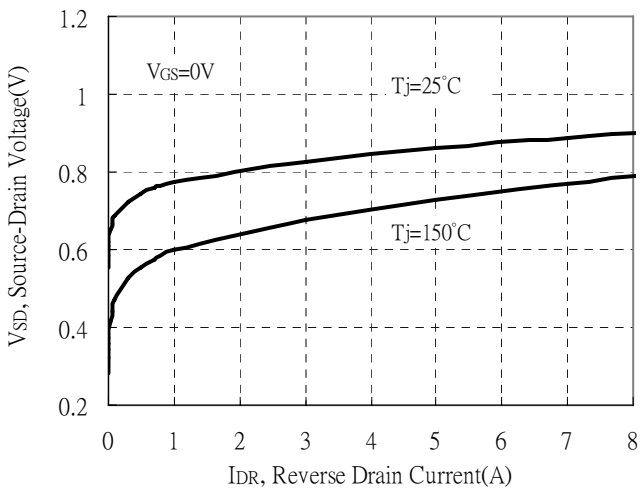
Brekdown Voltage vs Ambient Temperature



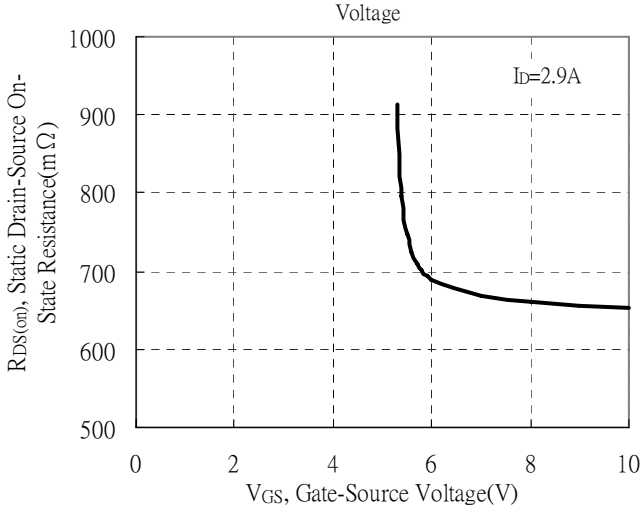
Static Drain-Source On-State resistance vs Drain Current



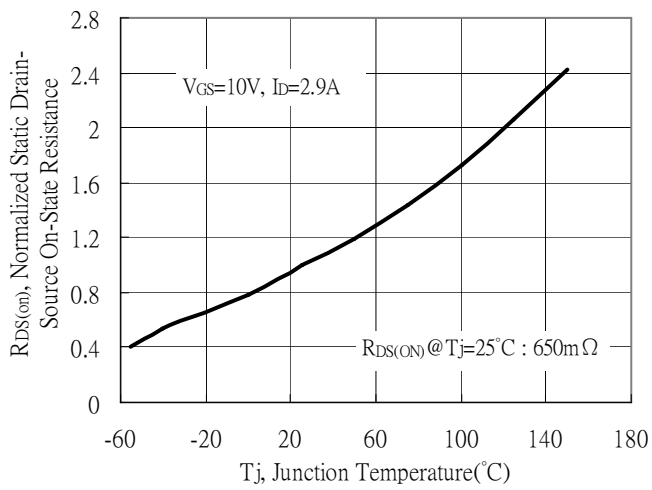
Reverse Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

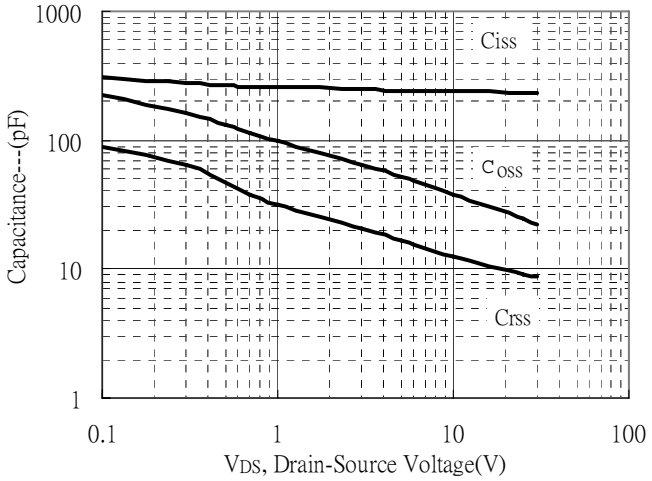


Drain-Source On-State Resistance vs Junction Tempearture

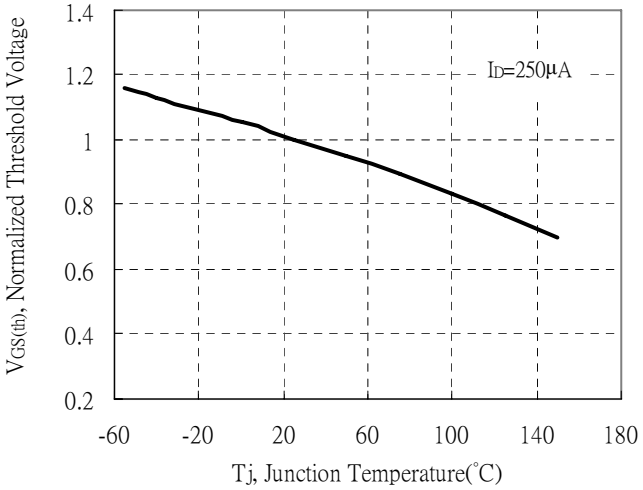


Typical Characteristics(Cont.)

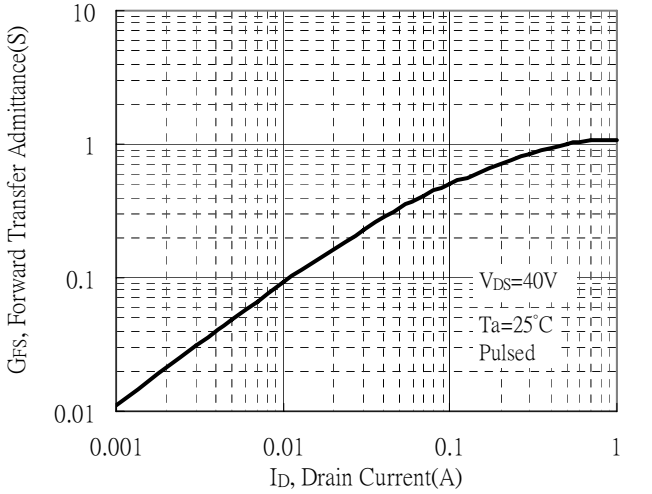
Capacitance vs Drain-to-Source Voltage



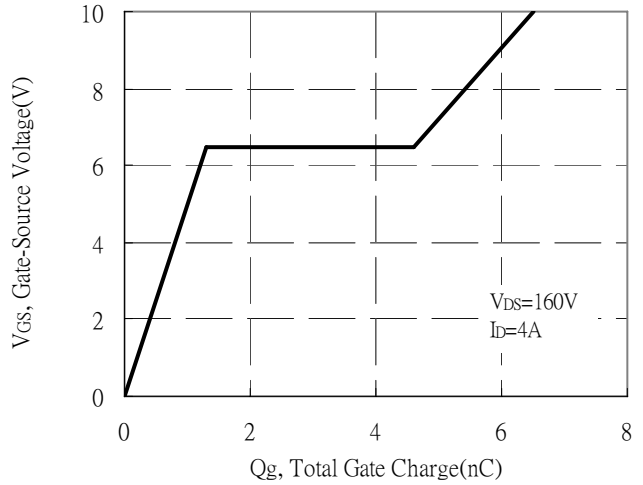
Threshold Voltage vs Junction Tempearture



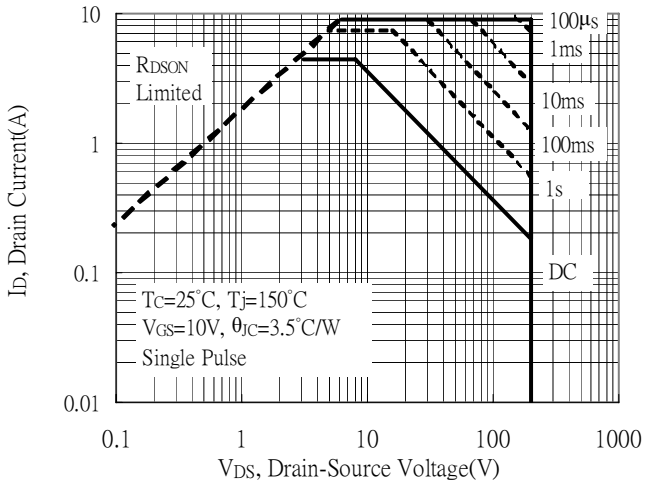
Forward Transfer Admittance vs Drain Current



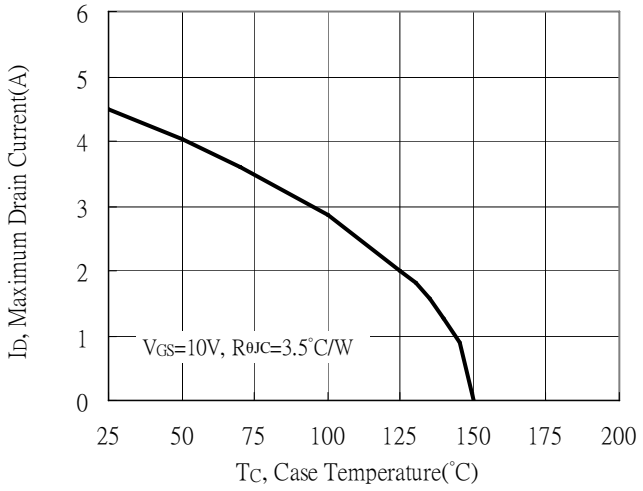
Gate Charge Characteristics



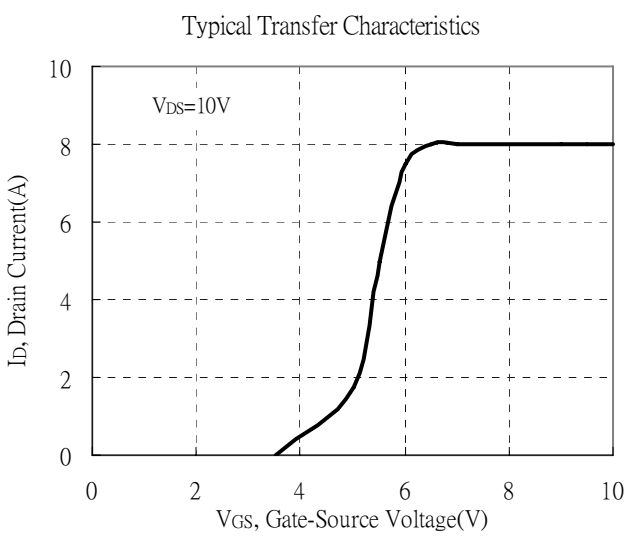
Maximum Safe Operating Area

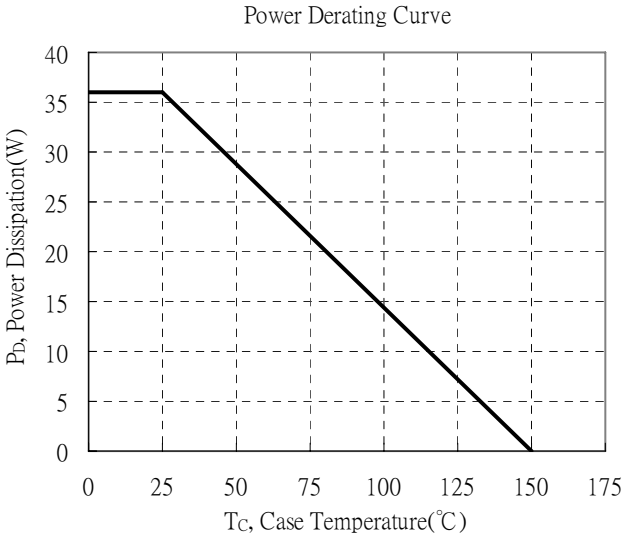


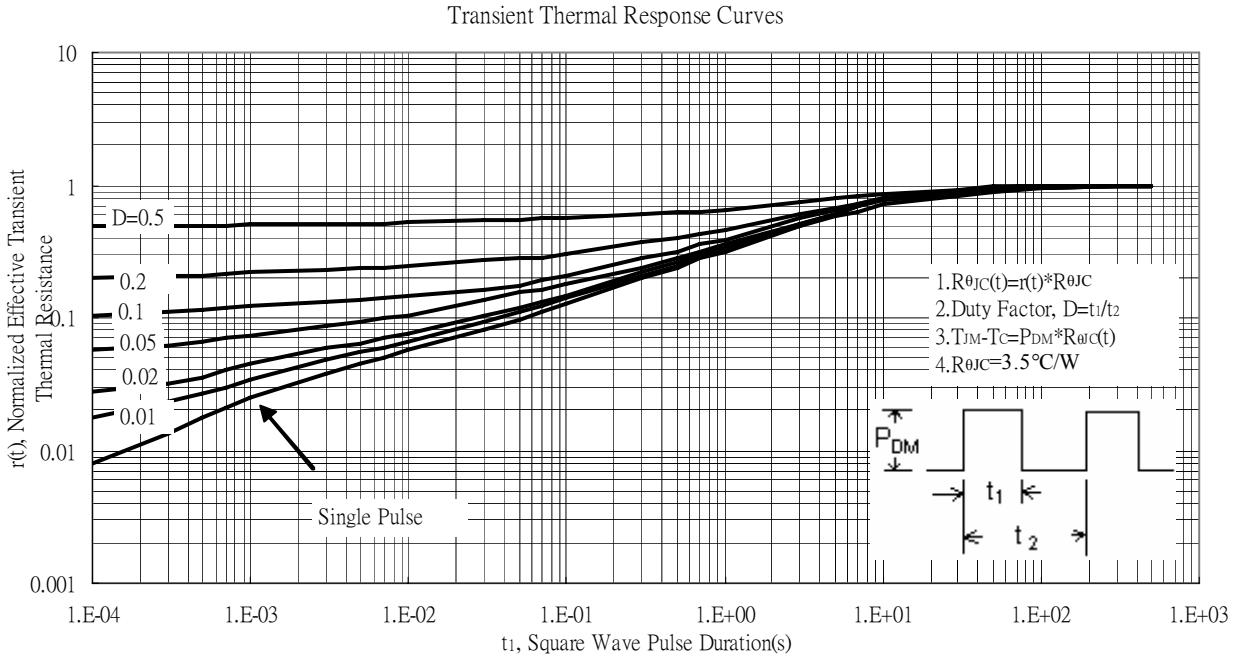
Maximum Drain Current vs Case Temperature



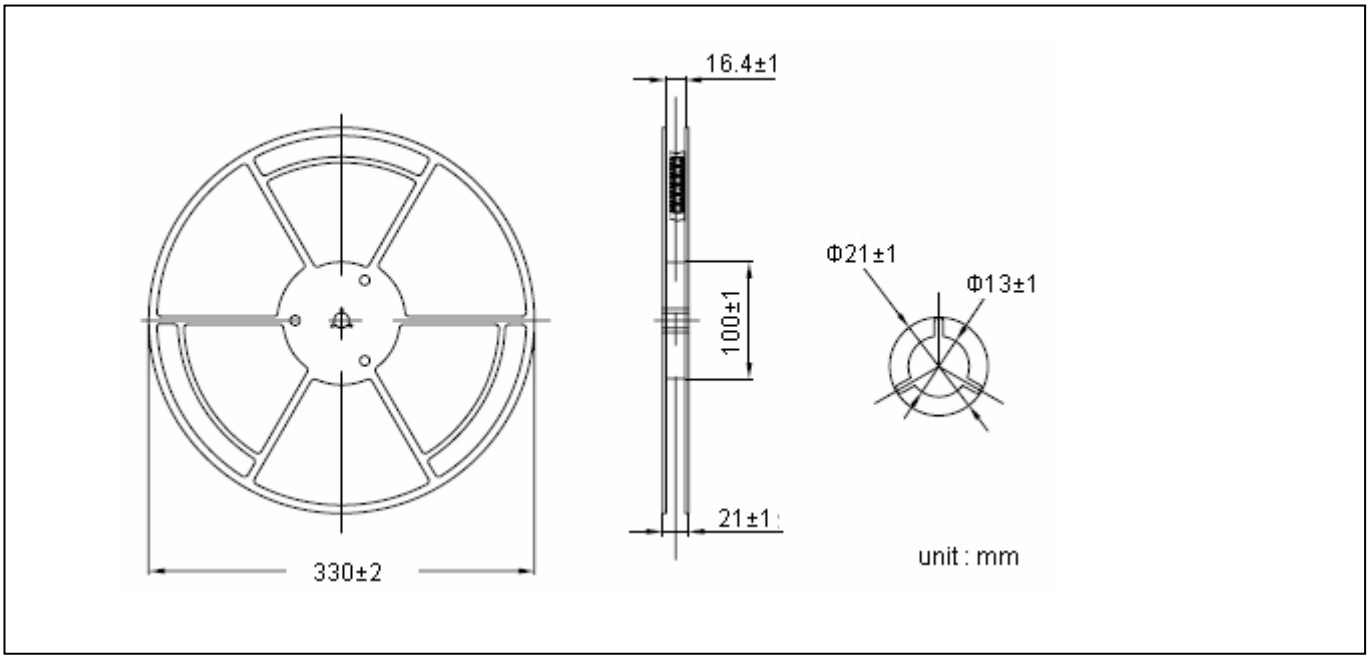
Typical Characteristics(Cont.)



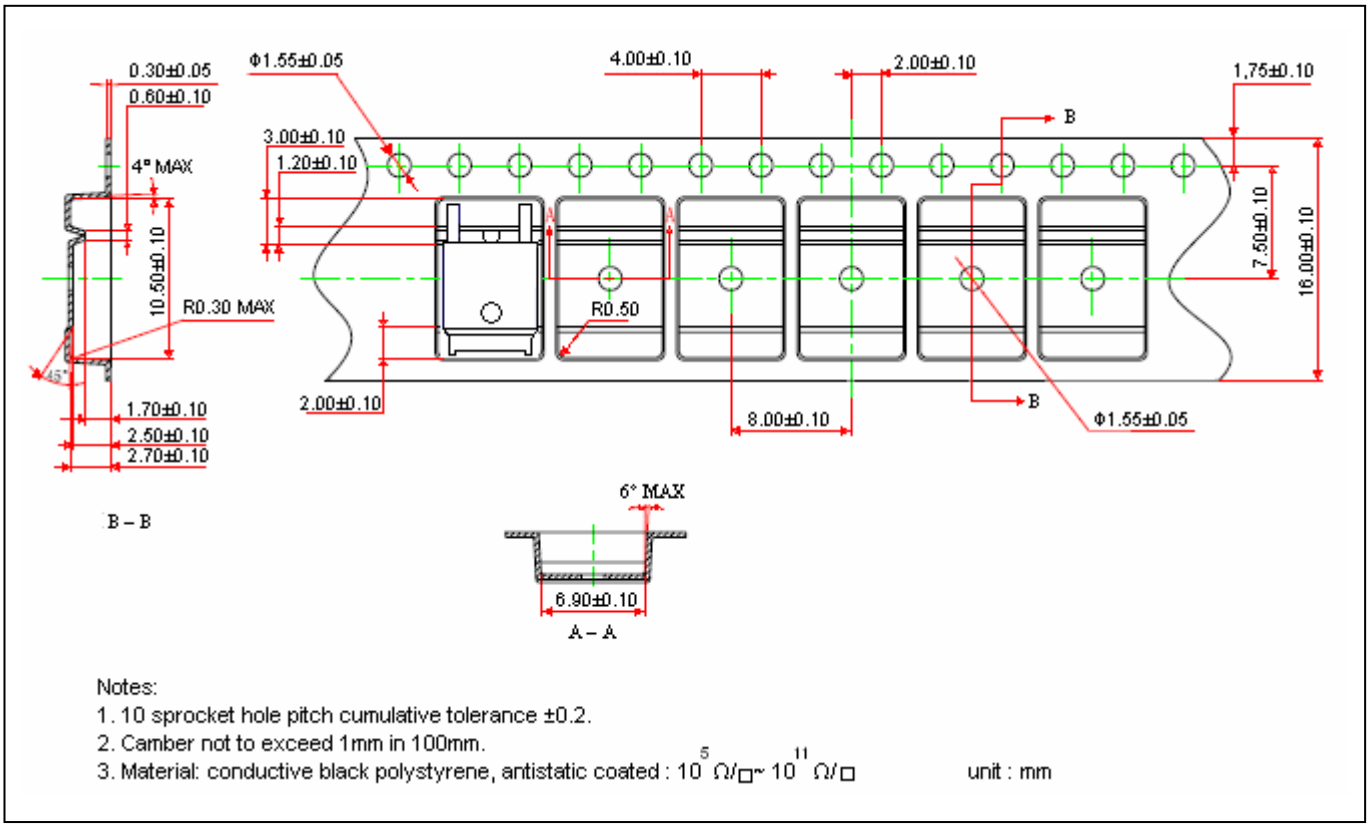




Reel Dimension



Carrier Tape Dimension

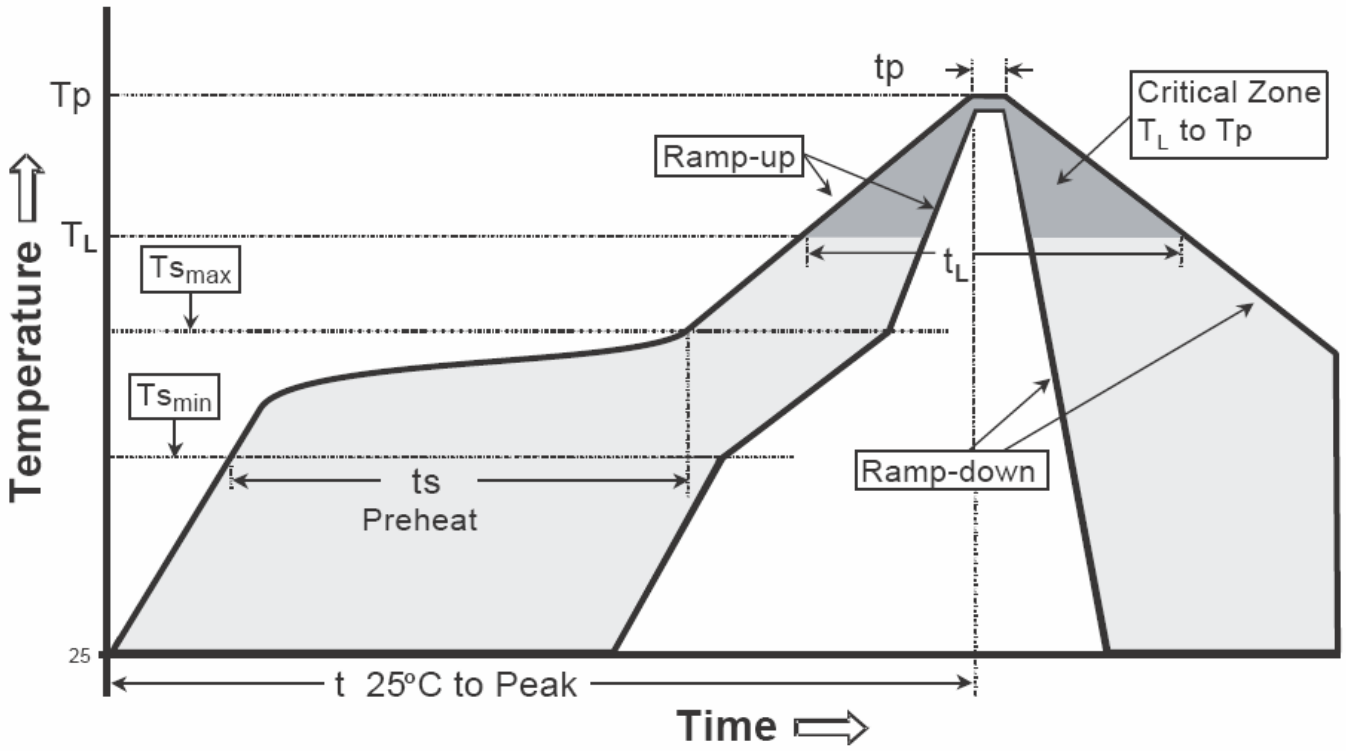


Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : 10^{5} Ω/□~ 10^{11} Ω/□ unit : mm

Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

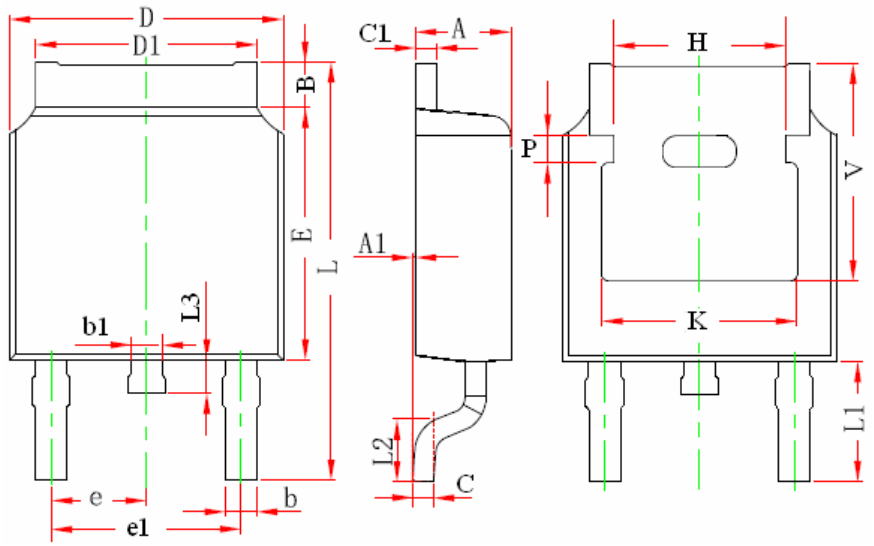
Recommended temperature profile for IR reflow

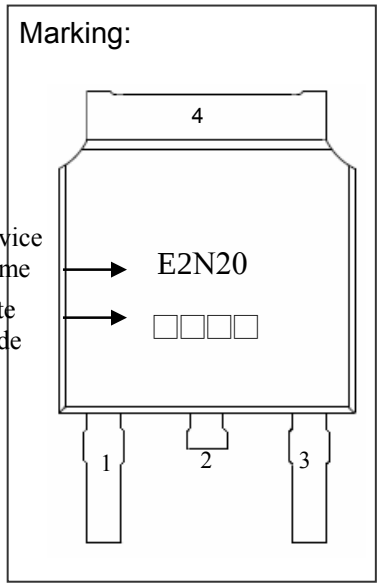


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(T_P)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

TO-252 Dimension





3-Lead TO-252 Plastic Surface Mount Package
Package Code: J3

Style: Pin 1.Gate 2.Drain 3.Source
4.Drain

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	e	0.086	0.094	2.186	2.386
A1	0.000	0.005	0.000	0.127	e1	0.172	0.188	4.372	4.772
B	0.039	0.048	0.990	1.210	H	0.163	REF	4.140	REF
b	0.026	0.034	0.660	0.860	K	0.190	REF	4.830	REF
b1	0.026	0.034	0.660	0.860	L	0.386	0.409	9.800	10.400
C	0.018	0.023	0.460	0.580	L1	0.114	REF	2.900	REF
C1	0.018	0.023	0.460	0.580	L2	0.055	0.067	1.400	1.700
D	0.256	0.264	6.500	6.700	L3	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	P	0.026	REF	0.650	REF
E	0.236	0.244	6.000	6.200	V	0.211	REF	5.350	REF

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

Material:

- Lead : Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.