

# N -Channel Enhancement Mode Power MOSFET

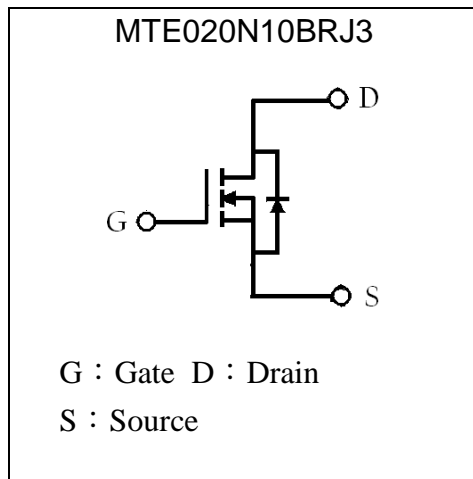
## MTE020N10BRJ3

### Features

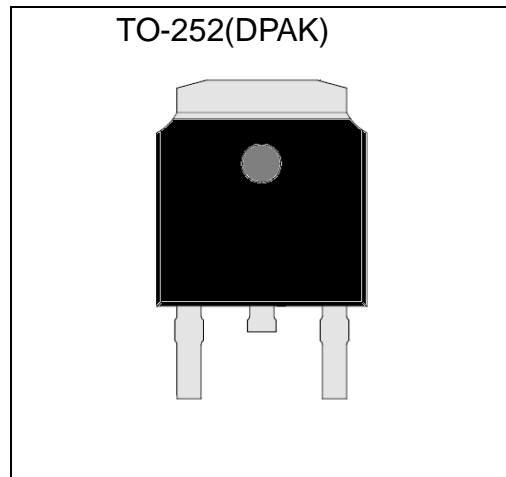
- Low Gate Charge
- Simple Drive Requirement
- Pb-free lead plating and halogen-free package

<b>B<sub>V</sub>DSS</b>	<b>100V</b>
<b>I<sub>D</sub>@ V<sub>GS</sub>=10V, T<sub>C</sub>=25°C</b>	<b>29A</b>
<b>R<sub>D</sub>S(ON)@ V<sub>GS</sub>=10V, I<sub>D</sub>=20A</b>	<b>24m Ω (typ)</b>

### Equivalent Circuit

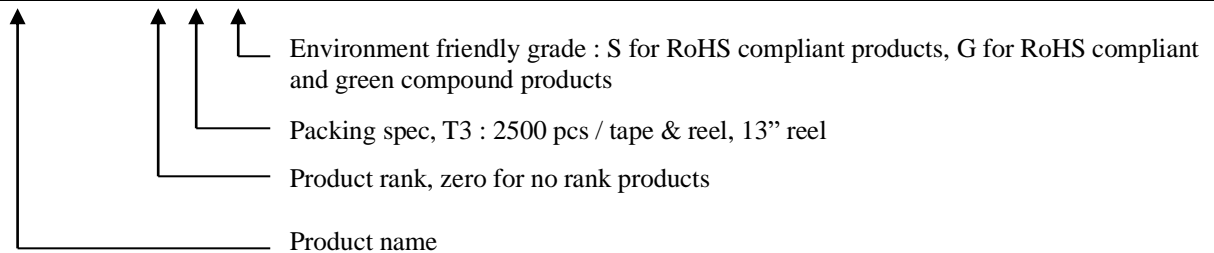


### Outline



### Ordering Information

Device	Package	Shipping
MTE020N10BRJ3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / Tape & Reel





**Absolute Maximum Ratings** (T<sub>C</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	100	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current @ T <sub>C</sub> =25°C, V <sub>GS</sub> =10V	I <sub>D</sub>	29	A
Continuous Drain Current @ T <sub>C</sub> =100°C, V <sub>GS</sub> =10V		18	
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =10V *3		6.5	
Continuous Drain Current @ T <sub>A</sub> =70°C, V <sub>GS</sub> =10V *3		5.2	
Pulsed Drain Current *1	I <sub>DM</sub>	116	
Avalanche Current @ L=0.1mH(Typical)	I <sub>AS</sub>	18	mJ
Avalanche Energy @ L=0.5mH	E <sub>AS</sub>	25	
Total Power Dissipation @T <sub>C</sub> =25°C	P <sub>D</sub>	50	W
Total Power Dissipation @T <sub>C</sub> =100°C		20	
Total Power Dissipation @T <sub>A</sub> =25°C *3		2.5	
Total Power Dissipation @T <sub>A</sub> =70°C *3		1.6	
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>θJC</sub>	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max *3	R <sub>θJA</sub>	50	
Thermal Resistance, Junction-to-ambient, max		110	

Note : \*1. Pulse width limited by maximum junction temperature  
 \*2. Duty cycle ≤ 1%  
 \*3. Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board

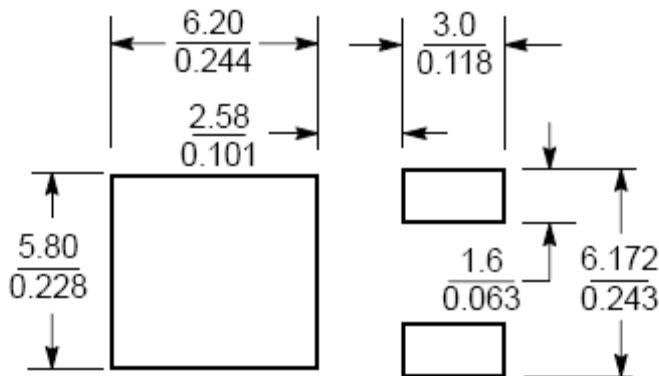
**Characteristics (T<sub>C</sub>=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	100	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.08	-	V/°C	Reference to 25°C, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	2	-	4	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub> *1	-	7.2	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =10A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V
	-	-	25		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>j</sub> =125°C
R <sub>DS(ON)</sub> *1	-	24	34	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =20A
<b>Dynamic</b>					
Q <sub>g</sub> *1, 2	-	13.8	-	nC	I <sub>D</sub> =20A, V <sub>DS</sub> =50V, V <sub>GS</sub> =10V
Q <sub>gs</sub> *1, 2	-	5.6	-		
Q <sub>gd</sub> *1, 2	-	3	-		
t <sub>d(ON)</sub> *1, 2	-	12.4	-	ns	V <sub>DS</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V,
t <sub>r</sub> *1, 2	-	14.6	-		

$t_{d(OFF)}$ *1, 2	-	19	-		$R_G=3\Omega$
$t_f$ *1, 2	-	6.2	-		
$C_{iss}$	-	877	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1MHz$
$C_{oss}$	-	109	-		
$C_{rss}$	-	27	-		
$R_g$	-	1.4	-	$\Omega$	$f=1MHz$
<b>Source-Drain Diode</b>					
$I_S$ *1	-	-	29	A	
$I_{SM}$ *3	-	-	116		
$V_{SD}$ *1	-	0.92	1.2	V	$I_S=20A, V_{GS}=0V$
$t_{rr}$	-	30.4	-	ns	$I_F=20A, dI_F/dt=100A/\mu s$
$Q_{rr}$	-	41.3	-	nC	

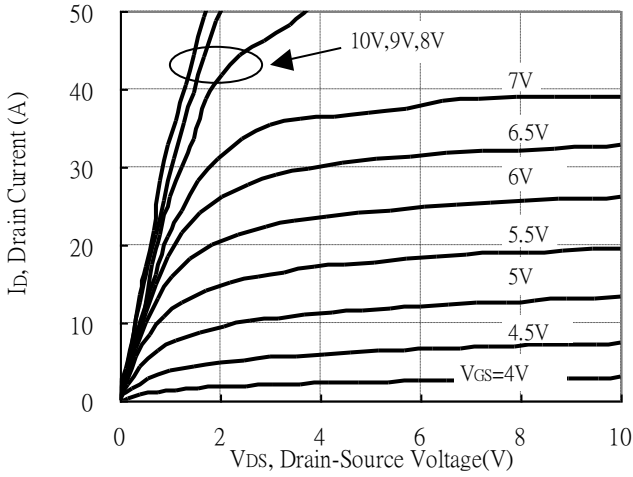
Note : \*1.Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$   
 \*2.Independent of operating temperature  
 \*3.Pulse width limited by maximum junction temperature.

### Recommended soldering footprint

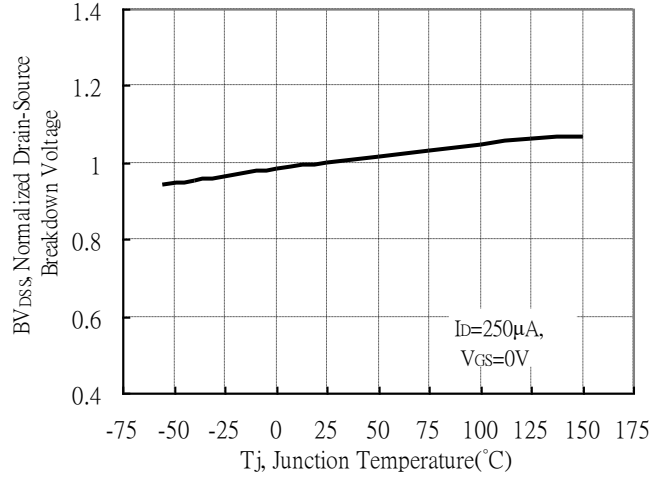

 Unit (  $\frac{mm}{inch}$  )

**Typical Characteristics**

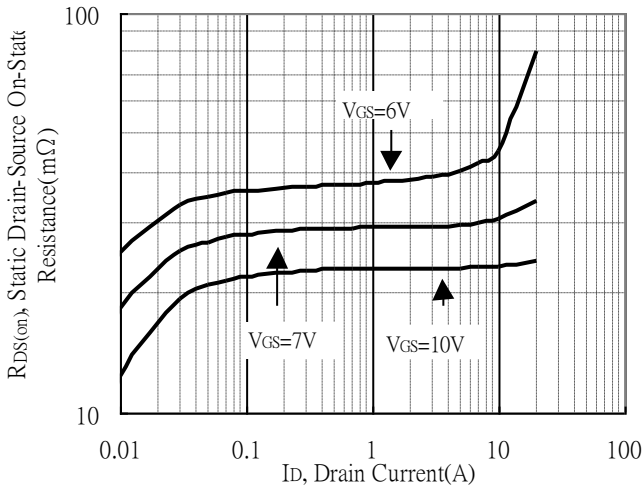
Typical Output Characteristics



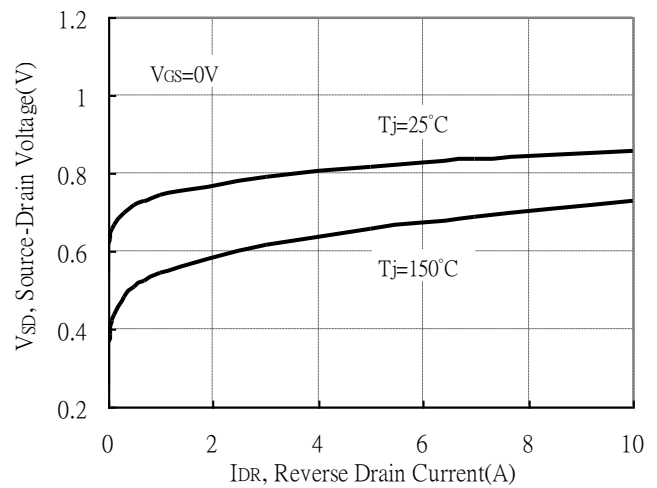
Brekdown Voltage vs Ambient Temperature



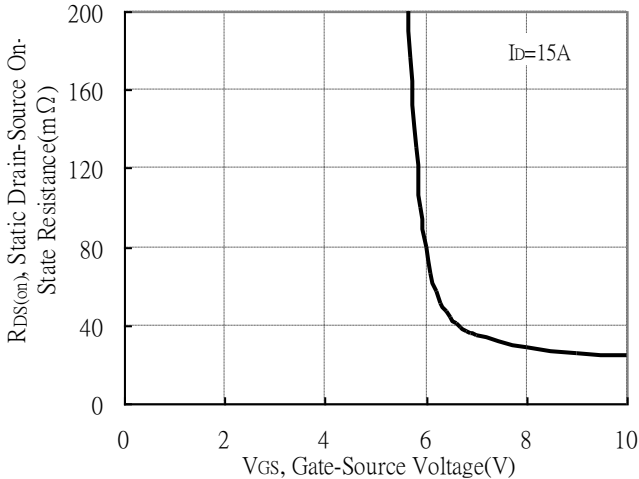
Static Drain-Source On-State resistance vs Drain Current



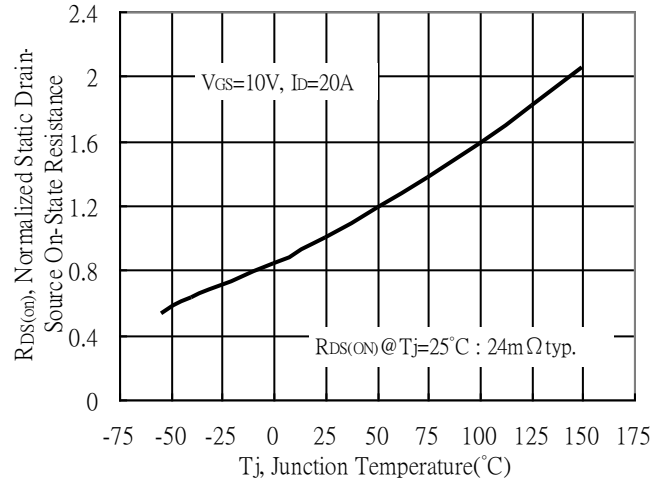
Reverse Drain Current vs Source-Drain Voltage



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

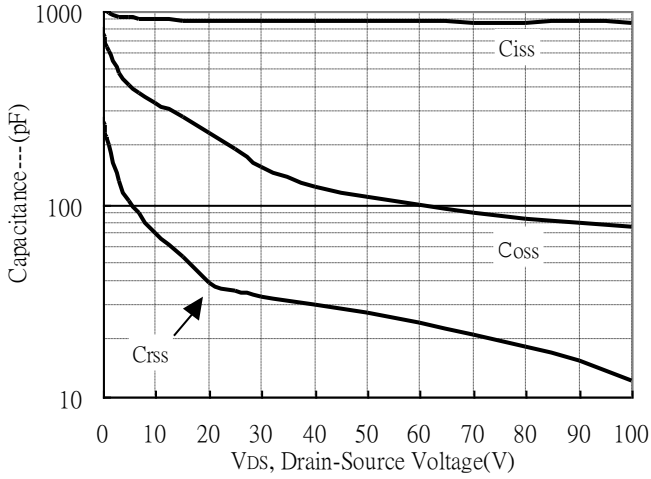


Drain-Source On-State Resistance vs Junction Temperature

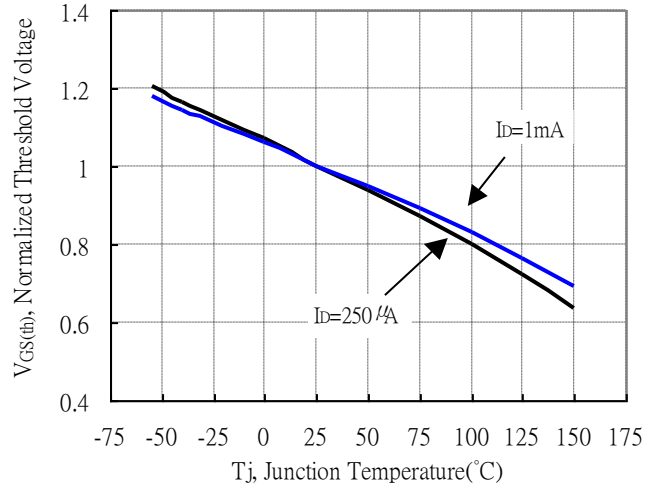


**Typical Characteristics(Cont.)**

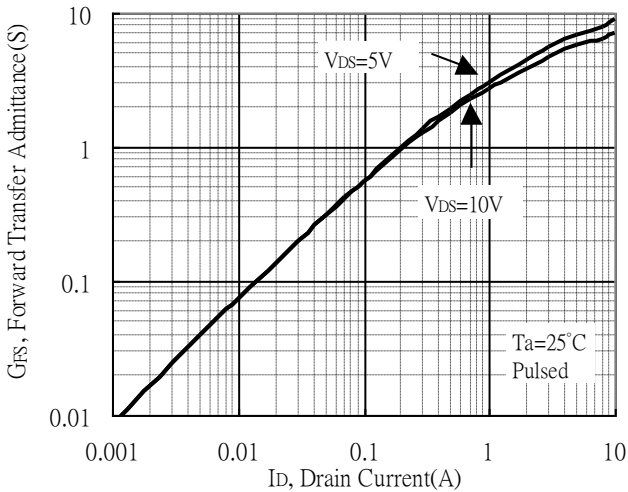
Capacitance vs Drain-to-Source Voltage



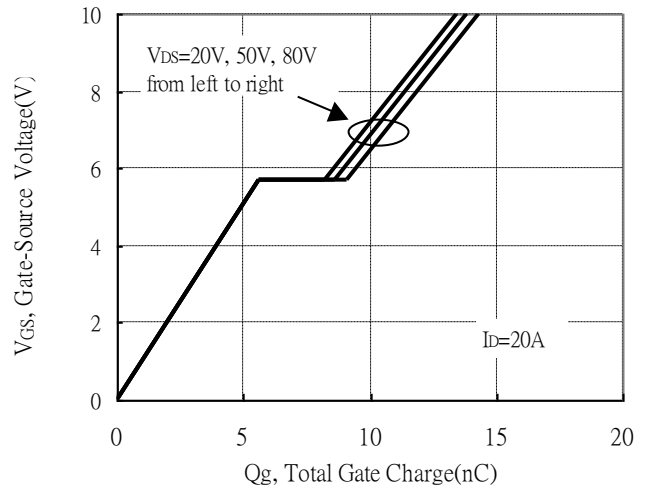
Threshold Voltage vs Junction Temperature



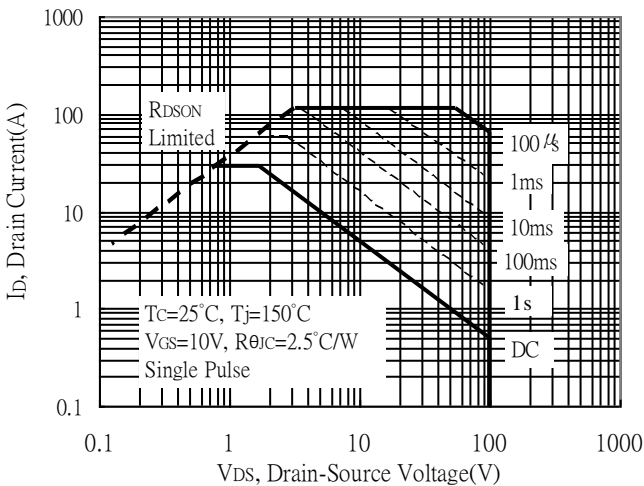
Forward Transfer Admittance vs Drain Current



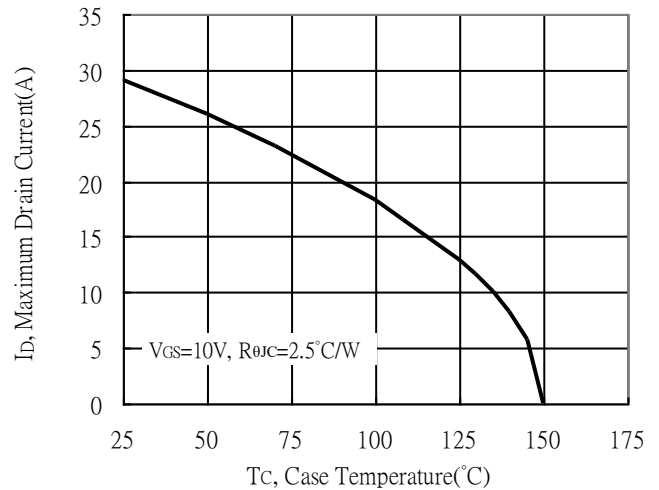
Gate Charge Characteristics



Maximum Safe Operating Area

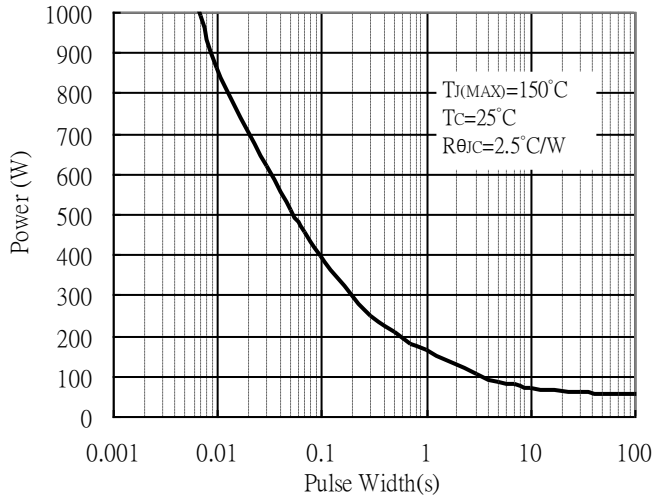


Maximum Drain Current vs Case Temperature

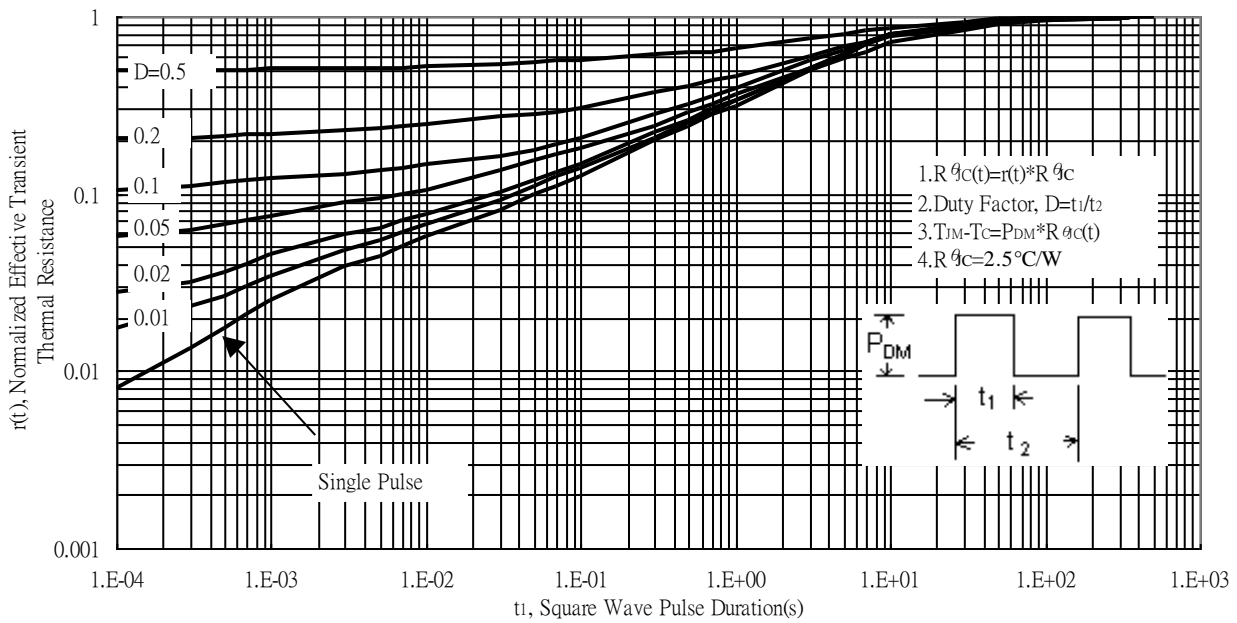


**Typical Characteristics(Cont.)**

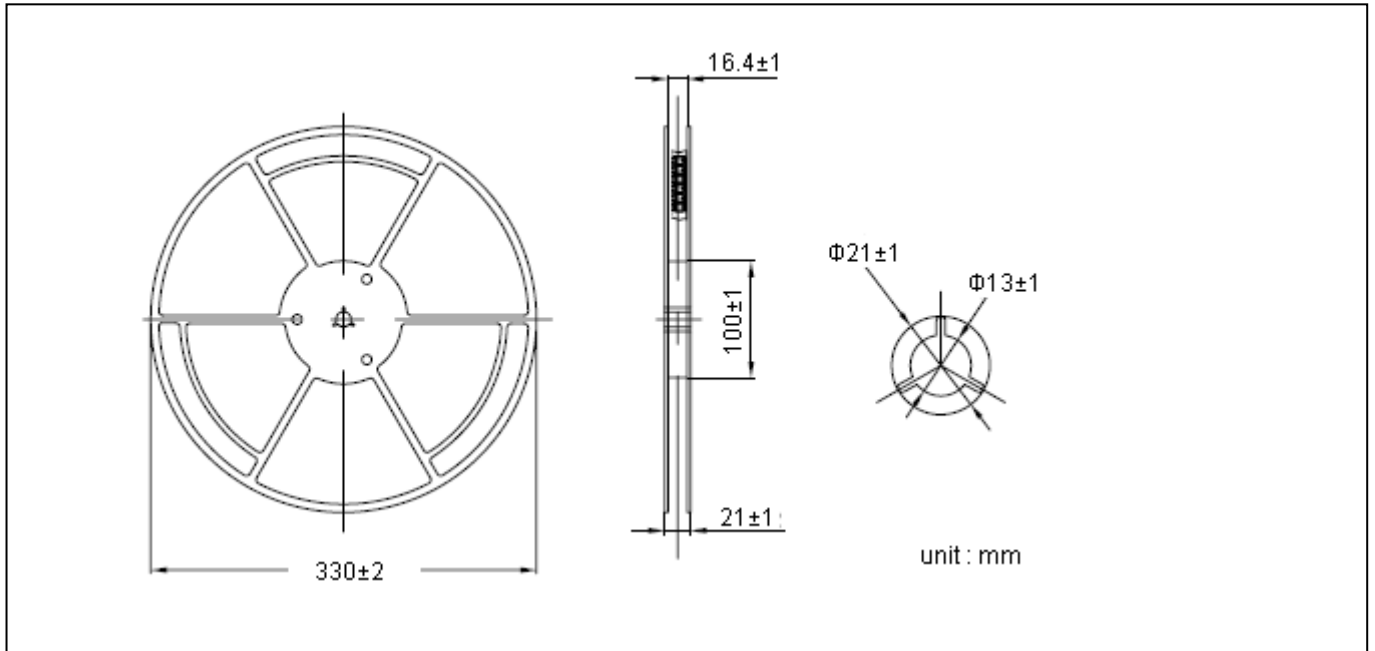
Single Pulse Power Rating, Junction to Case



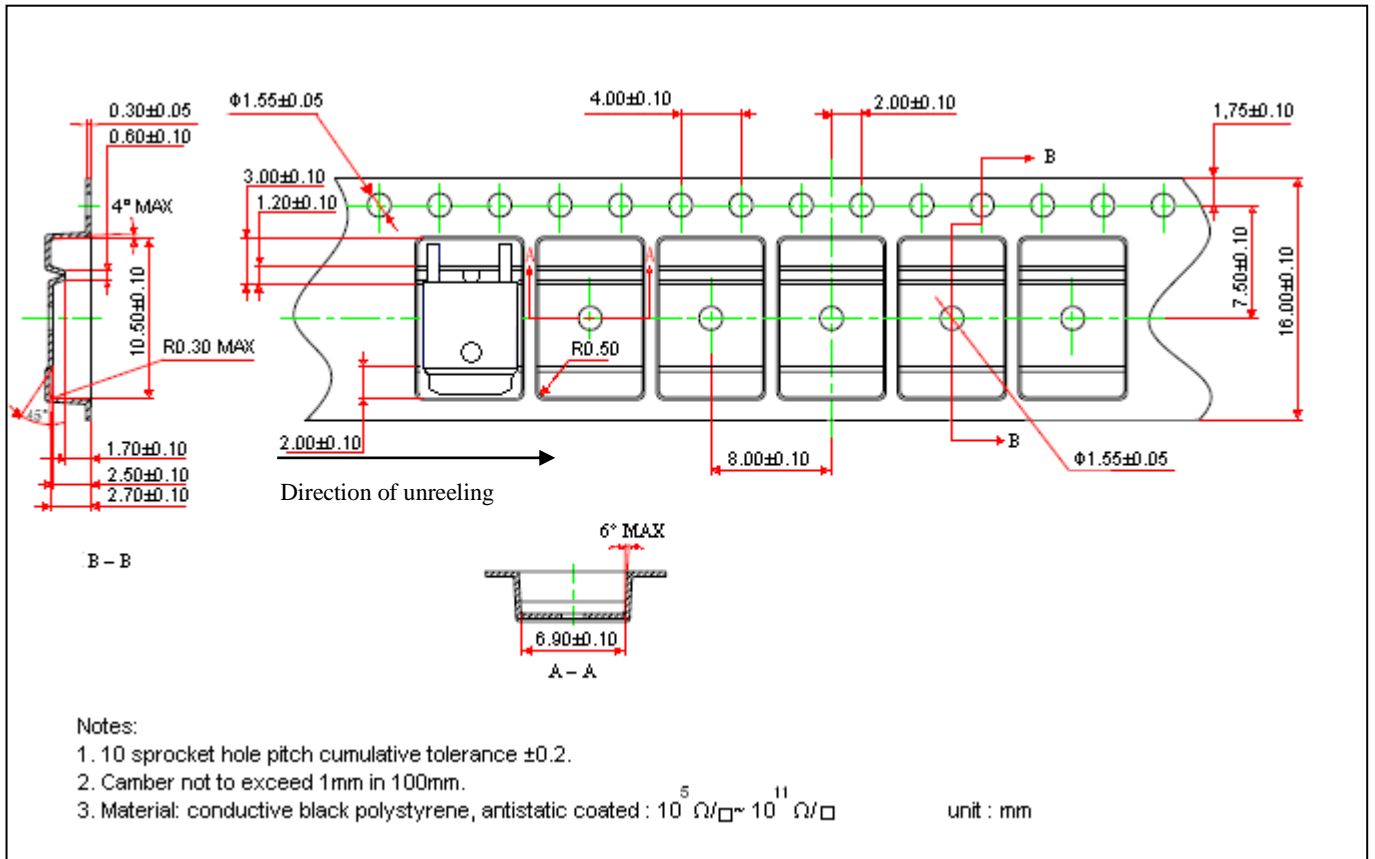
Transient Thermal Response Curves



**Reel Dimension**



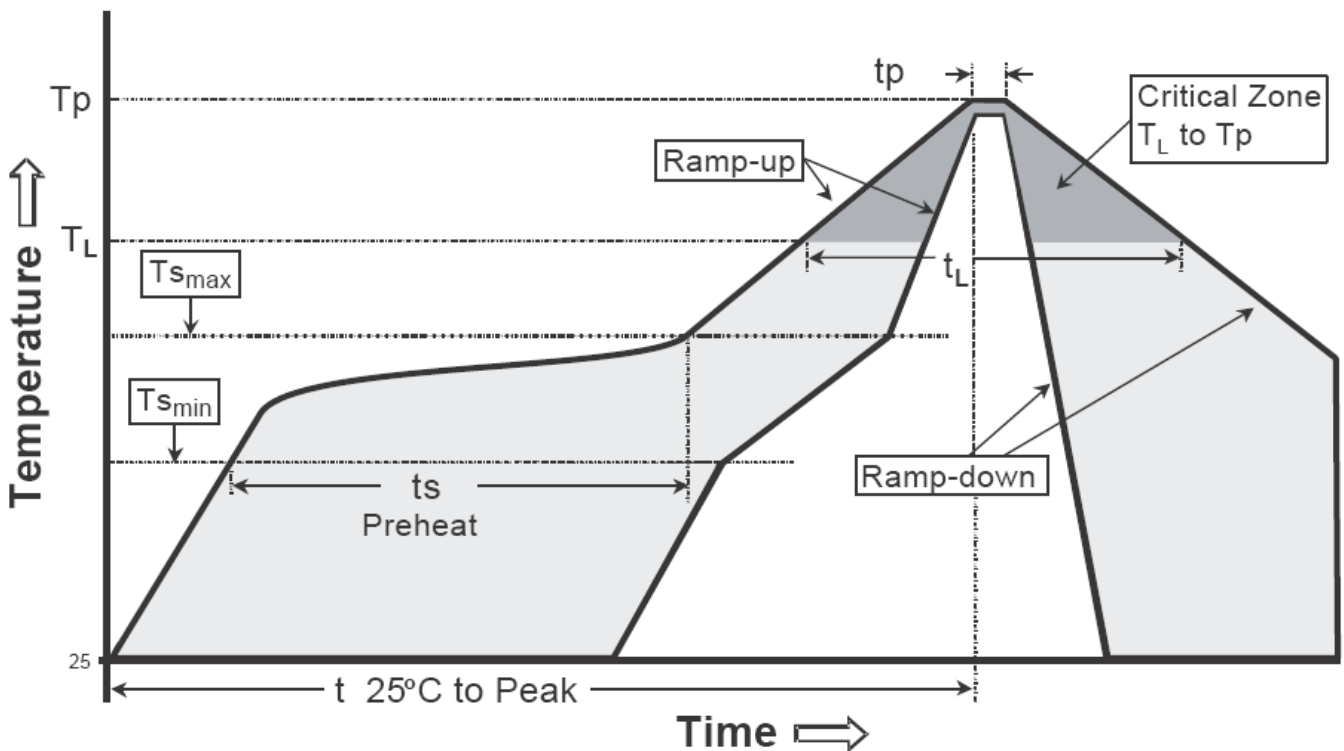
**Carrier Tape Dimension**



**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**

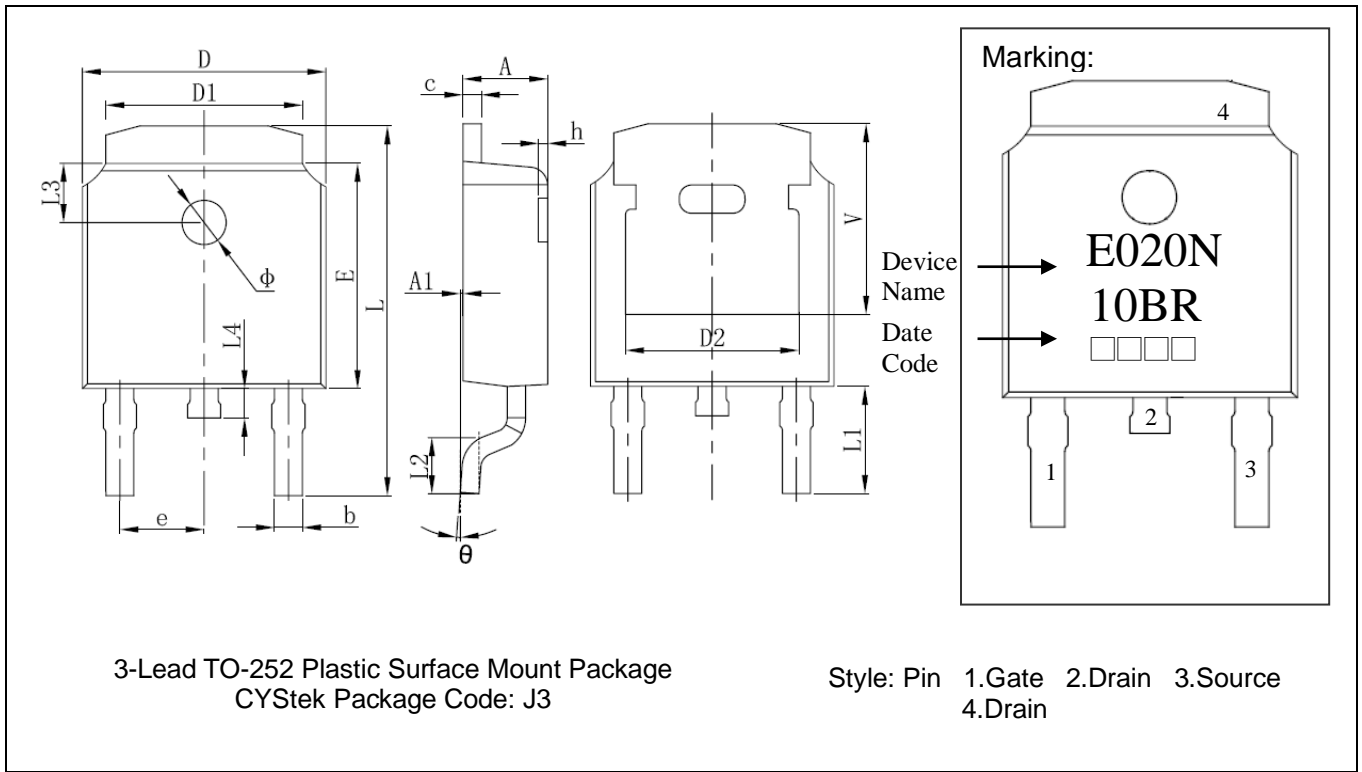


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (Tl)	183°C	217°C
- Time (tL)	60-150 seconds	60-150 seconds
Peak Temperature(TP)	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**



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	L	0.382	0.406	9.712	10.312
A1	0.000	0.005	0.000	0.127	L1	0.114	REF	2.900	REF
b	0.025	0.030	0.635	0.770	L2	0.055	0.067	1.400	1.700
c	0.018	0.023	0.460	0.580	L3	0.063	REF	1.600	REF
D	0.256	0.264	6.500	6.700	L4	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	Φ	0.043	0.051	1.100	1.300
D2	0.190	REF	4.830	REF	θ	0°	8°	0°	8°
E	0.236	0.244	6.000	6.200	h	0.000	0.012	0.000	0.300
e	0.086	0.094	2.186	2.386	v	0.207	REF	5.250	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.  
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

**Material:**

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

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