

**N -Channel Enhancement Mode Power MOSFET**

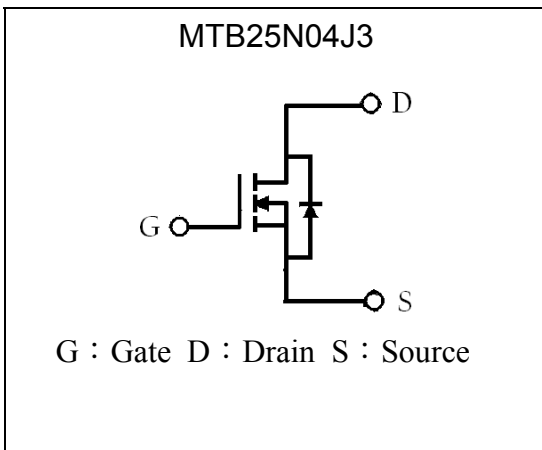
# MTB25N04J3

<b>BV<sub>DSS</sub></b>	<b>40V</b>
<b>I<sub>D</sub></b>	<b>29A</b>
<b>R<sub>DS(ON)</sub>@ V<sub>GS</sub>=10V, I<sub>D</sub>=12A</b>	<b>20m Ω (typ)</b>
<b>R<sub>DS(ON)</sub>@ V<sub>GS</sub>=4.5V, I<sub>D</sub>=10A</b>	<b>27m Ω (typ)</b>

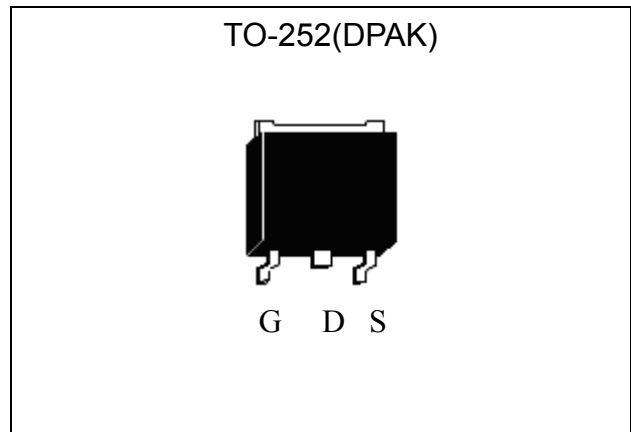
**Features**

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

**Equivalent Circuit**

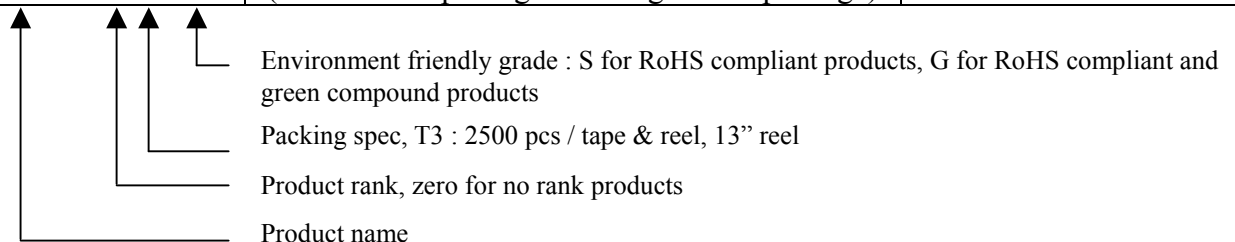


**Outline**



**Ordering Information**

Device	Package	Shipping
MTB25N04J3-0-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>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current @ T <sub>C</sub> =25°C	I <sub>D</sub>	29	A
Continuous Drain Current @ T <sub>C</sub> =100°C		20	
Continuous Drain Current @ T <sub>A</sub> =25°C		6.5	
Continuous Drain Current @ T <sub>A</sub> =100°C		4.6	
Pulsed Drain Current *1	I <sub>DM</sub>	60	
Avalanche Current	I <sub>AS</sub>	10	
Avalanche Energy @ L=0.1mH, I <sub>D</sub> =10A, R <sub>G</sub> =25Ω	E <sub>AS</sub>	5	mJ
Repetitive Avalanche Energy @ L=0.05mH *2	E <sub>AR</sub>	2	
Total Power Dissipation @T <sub>C</sub> =25°C	P <sub>d</sub>	36	W
Total Power Dissipation @T <sub>C</sub> =100°C		12	
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55~+175	°C

Note : \*1. Pulse width limited by maximum junction temperature

\*2. Duty cycle ≤ 1%

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>th,j-c</sub>	4.1	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>th,j-a</sub>	80	°C/W

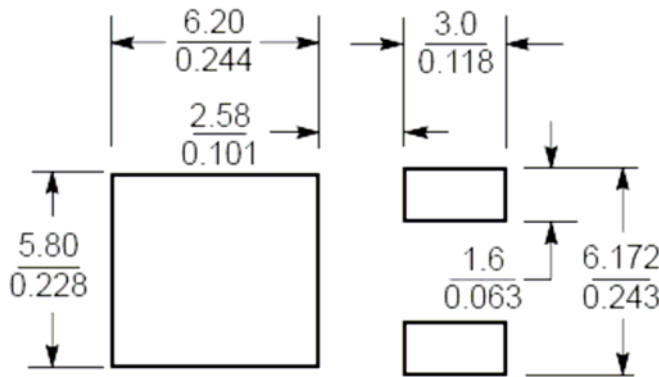
**Characteristics (T<sub>C</sub>=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	40	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.04	-	V/°C	Reference to 25°C, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1.0	1.3	2.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub> *1	-	12	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =12A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20, V <sub>DS</sub> =0
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =32V, V <sub>GS</sub> =0
	-	-	25		V <sub>DS</sub> =30V, V <sub>GS</sub> =0, T <sub>j</sub> =125°C
R <sub>DS(ON)</sub> *1	-	20	26	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =12A
	-	27	35		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A
<b>Dynamic</b>					
Q <sub>g</sub> *1, 2	-	10	-	nC	I <sub>D</sub> =10A, V <sub>DS</sub> =20V, V <sub>GS</sub> =10V
Q <sub>gs</sub> *1, 2	-	2.4	-		
Q <sub>gd</sub> *1, 2	-	2.5	-		

$t_{d(ON)}$ *1, 2	-	7	-	ns	$V_{DS}=20V, I_D=1A, V_{GS}=10V,$ $R_G=6\Omega$
$t_r$ *1, 2	-	5	-		
$t_{d(OFF)}$ *1, 2	-	21	-		
$t_f$ *1, 2	-	8	-		
$C_{iss}$	-	640	-	pF	$V_{GS}=0V, V_{DS}=20V, f=1MHz$
$C_{oss}$	-	51	-		
$C_{rss}$	-	45	-		
$R_g$	-	2.5	-	$\Omega$	$V_{GS}=15mV, V_{DS}=0, f=1MHz$
<b>Source-Drain Diode</b>					
$I_S$ *1	-	-	29	A	
$I_{SM}$ *3	-	-	60		
$V_{SD}$ *1	-	0.88	1.3	V	$I_S=12A, V_{GS}=0V$
$t_{rr}$	-	16	-	ns	$I_F=5A, dI_F/dt=100A/\mu s$
$Q_{rr}$	-	10	-	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.

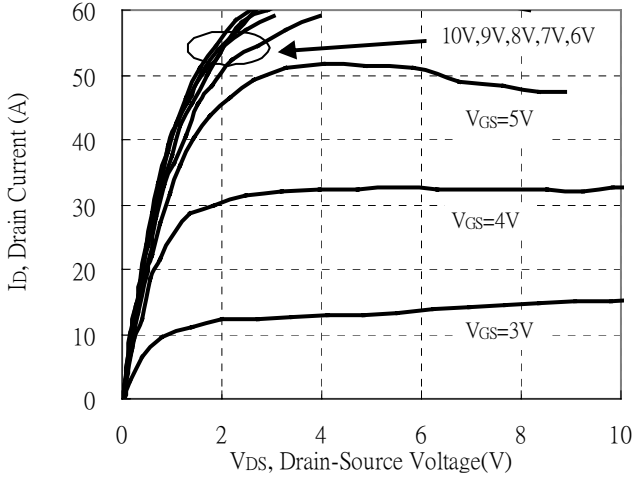
### Recommended soldering footprint


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

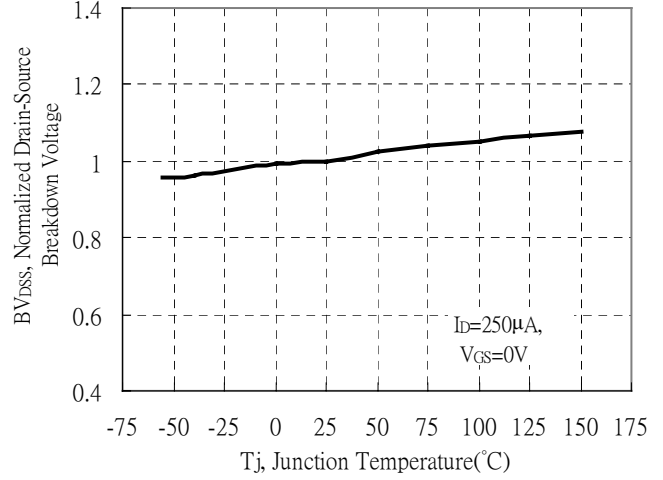


**Typical Characteristics**

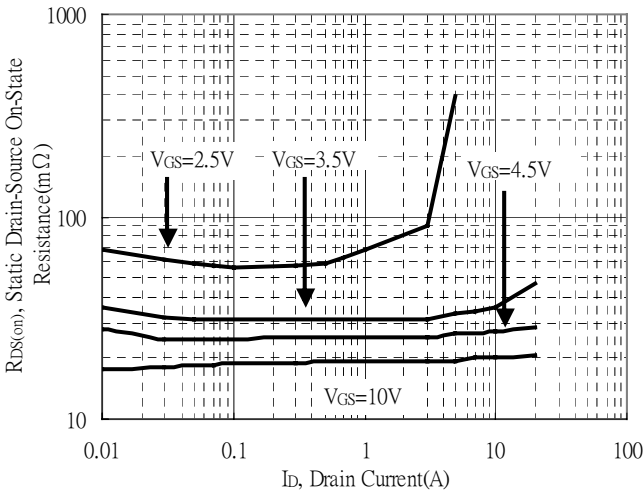
Typical Output Characteristics



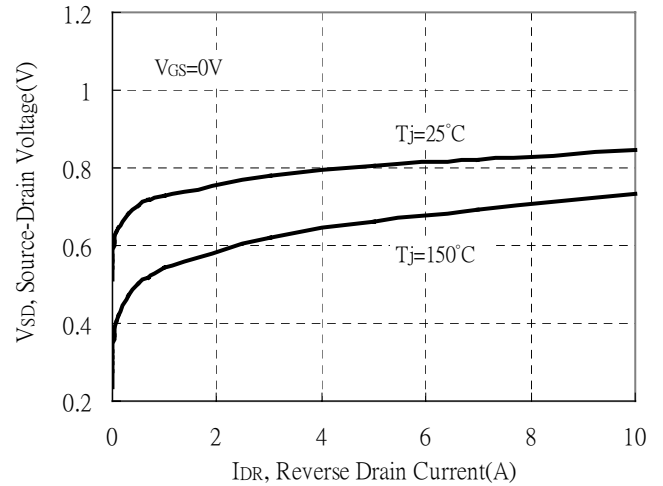
Brekdown Voltage vs Ambient Temperature



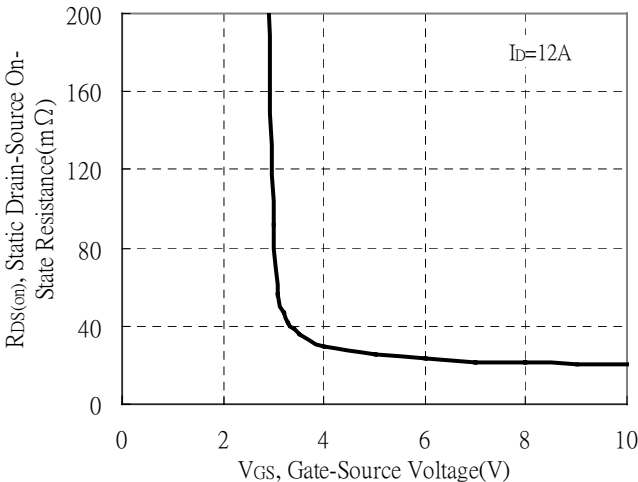
Static Drain-Source On-State resistance vs Drain Current



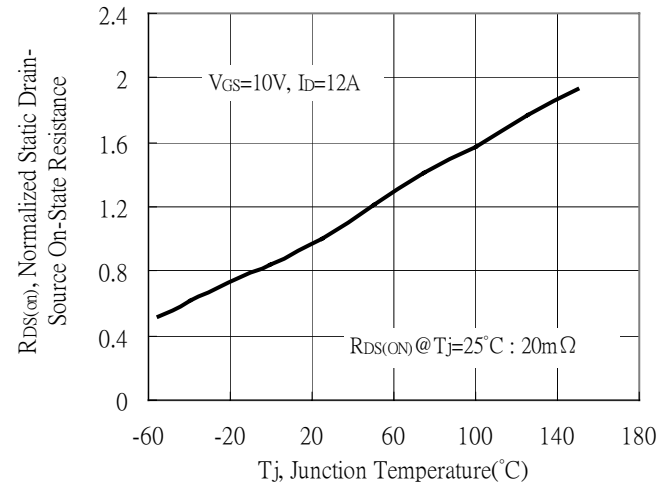
Reverse Drain Current vs Source-Drain Voltage



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



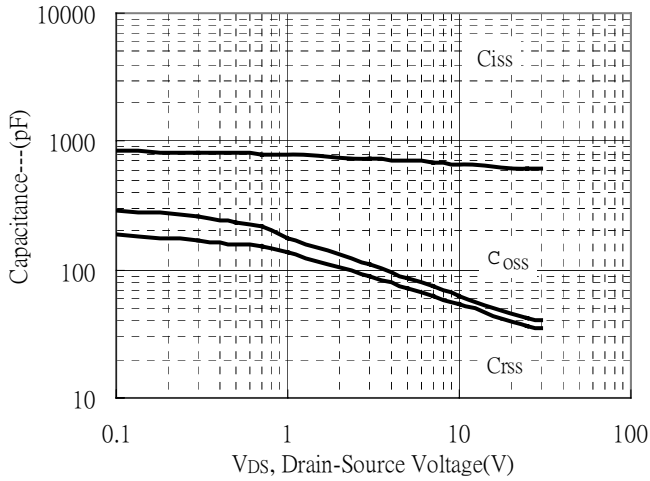
Drain-Source On-State Resistance vs Junction Temperature



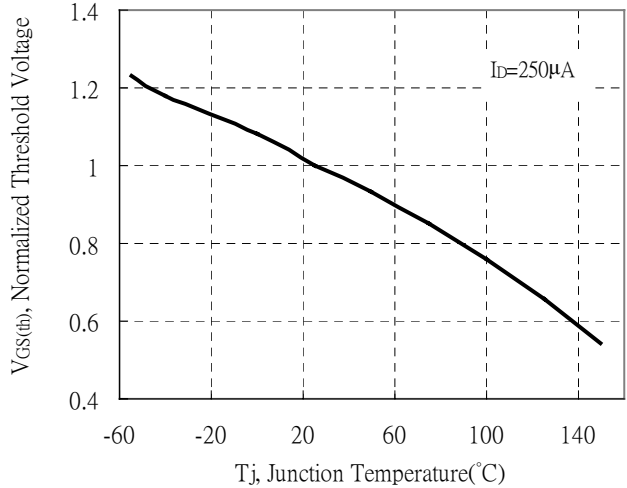


**Typical Characteristics(Cont.)**

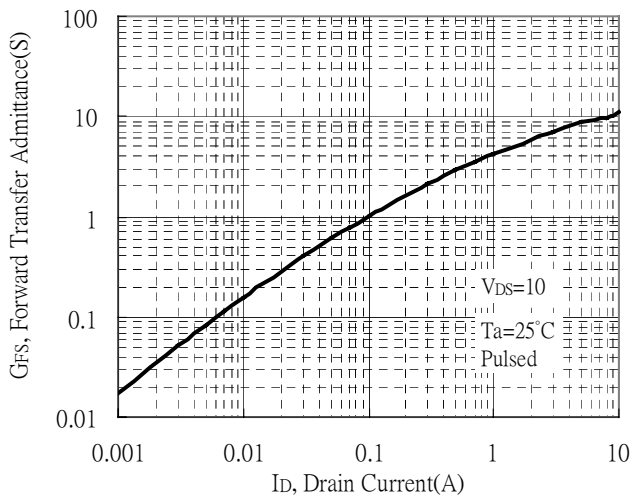
Capacitance vs Drain-to-Source Voltage



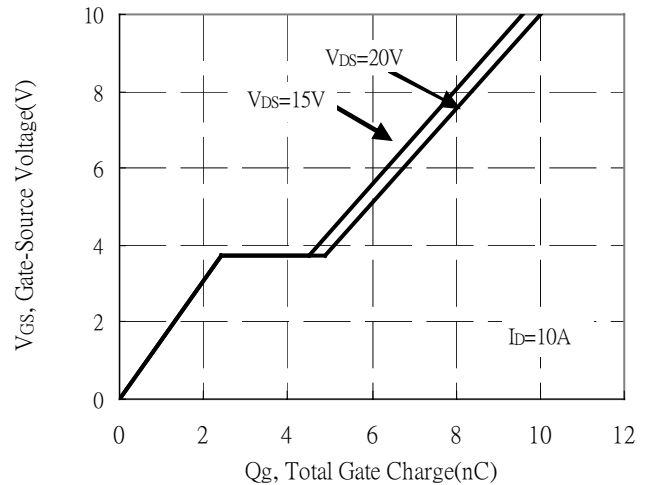
Threshold Voltage vs Junction Temperature



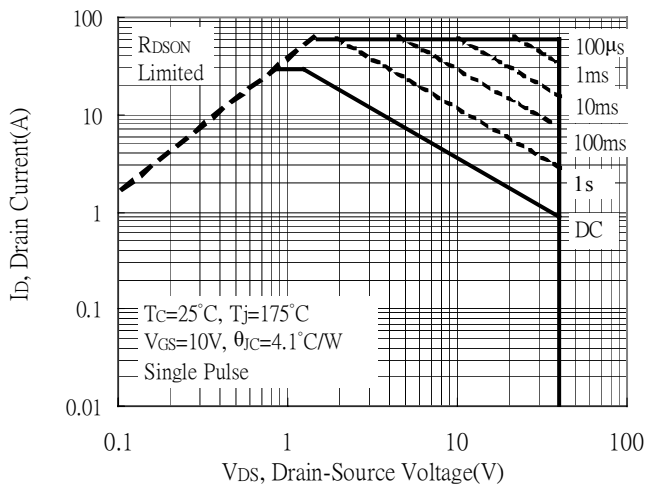
Forward Transfer Admittance vs Drain Current



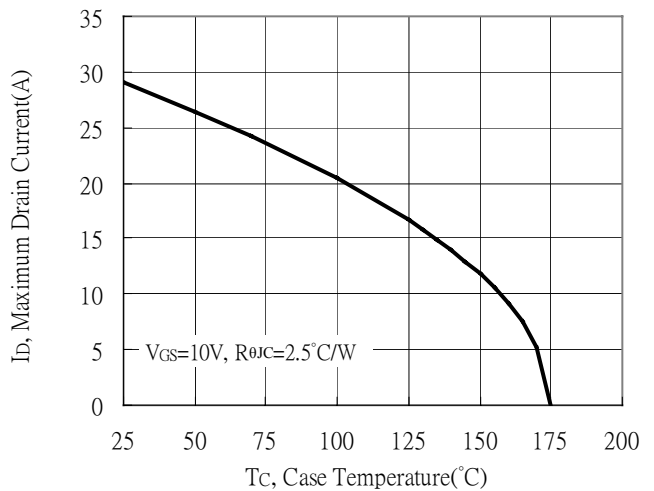
Gate Charge Characteristics



Maximum Safe Operating Area



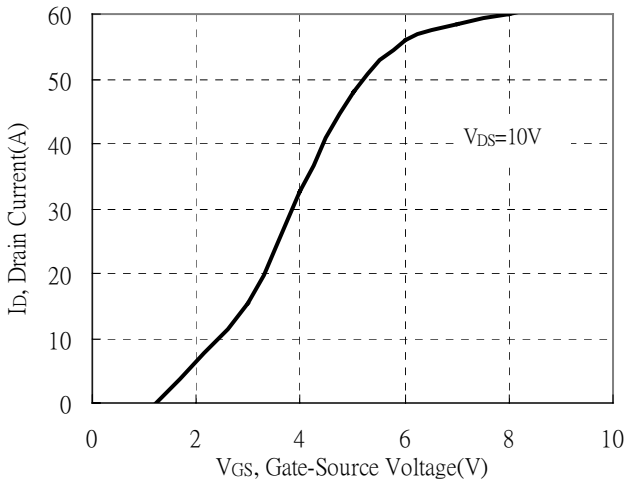
Maximum Drain Current vs Case Temperature



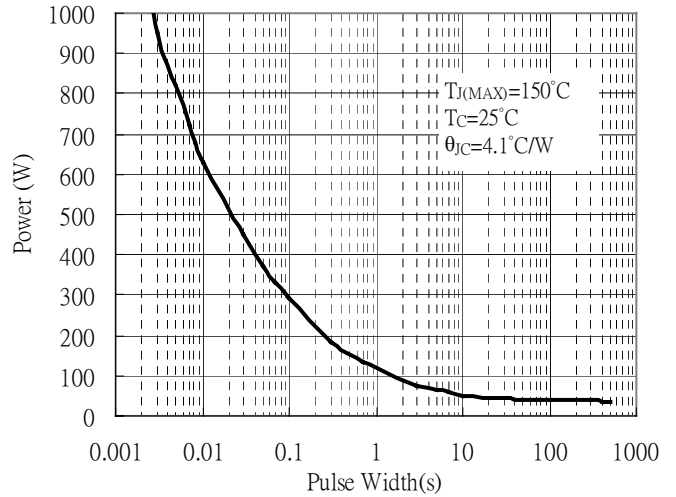


**Typical Characteristics(Cont.)**

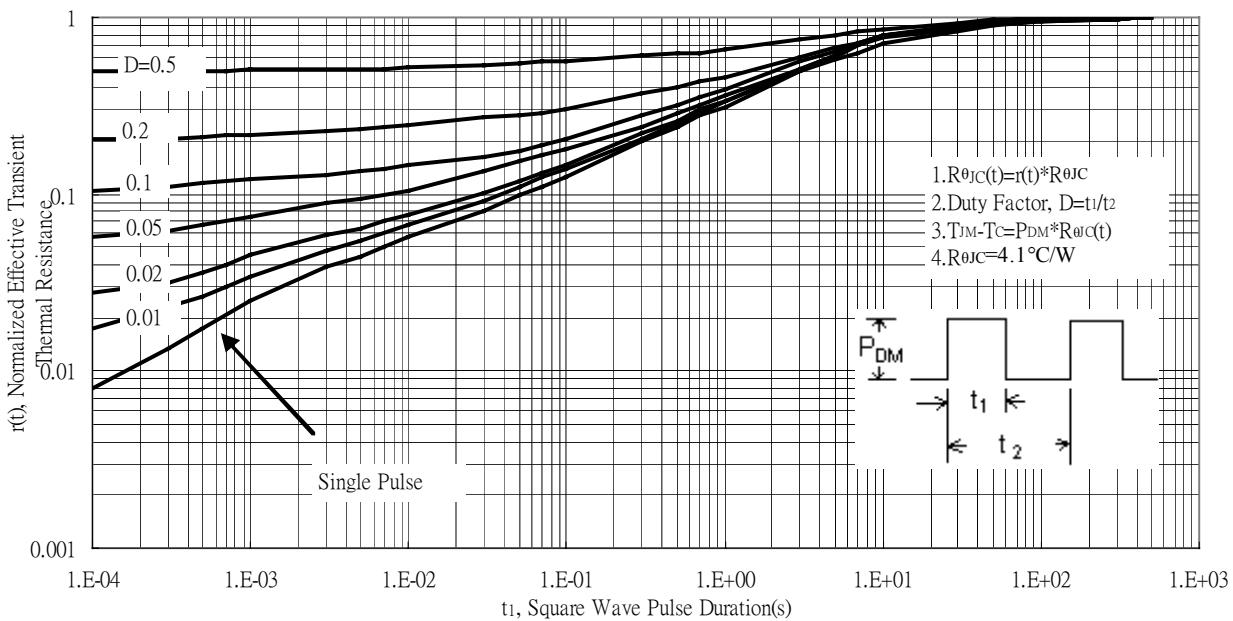
Typical Transfer Characteristics



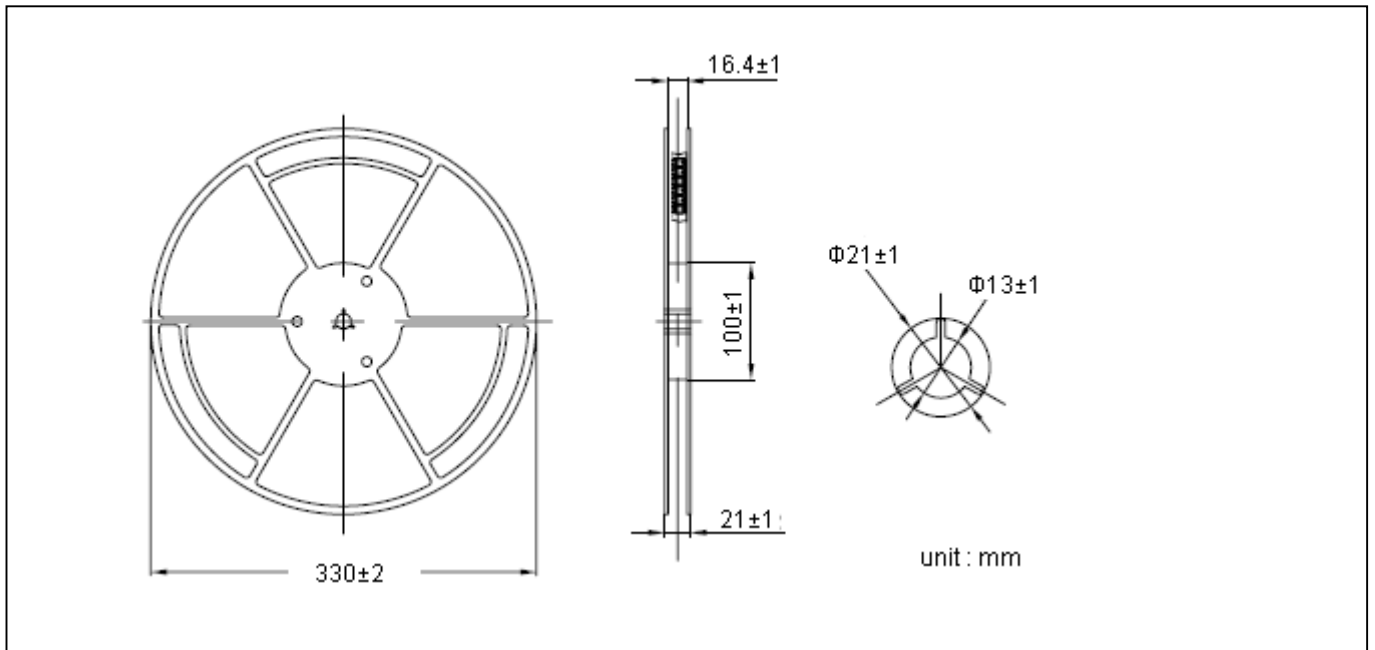
Single Pulse Maximum Power Dissipation



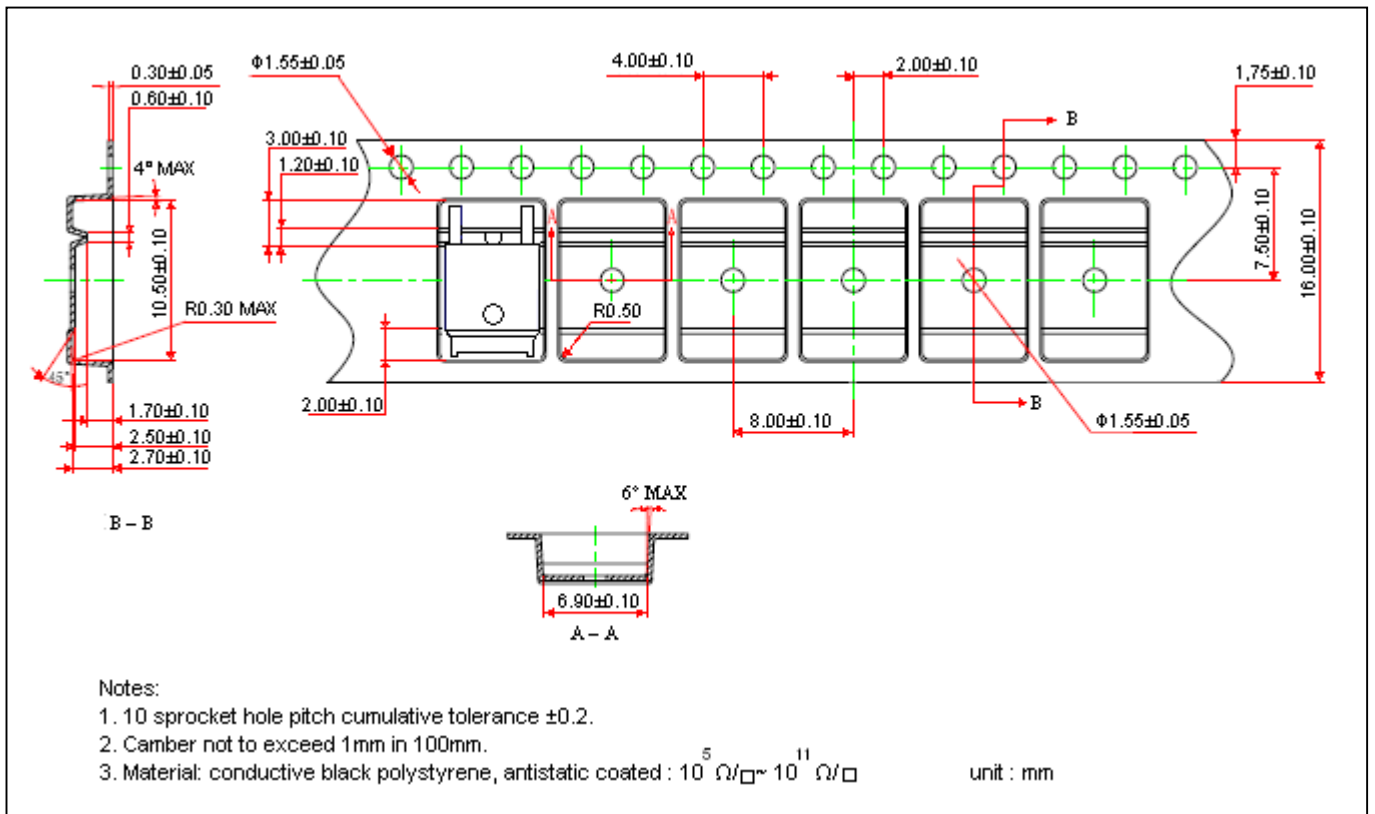
Transient Thermal Response Curves



**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**

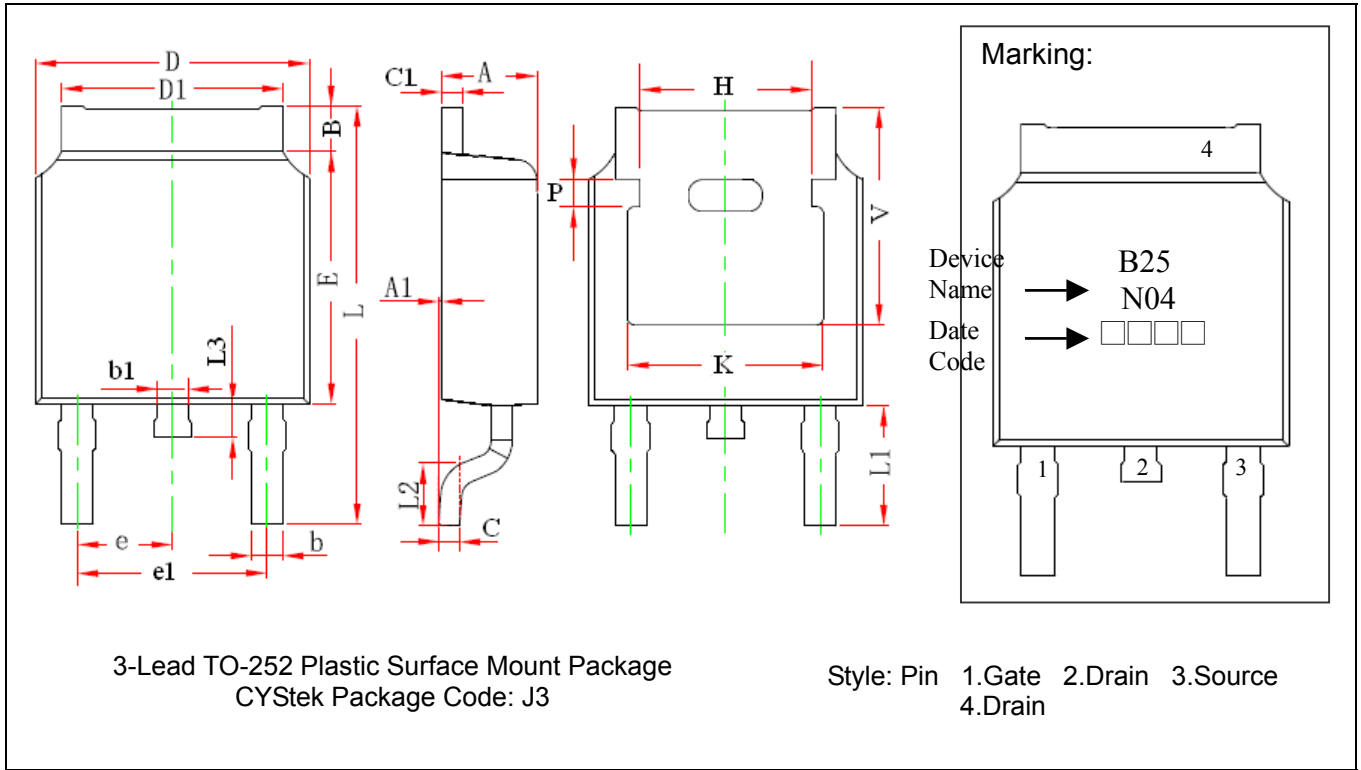


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	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	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:**
- Controlling dimension: millimeters.
  - Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
  - 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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