

# N-Channel Enhancement Mode Power MOSFET

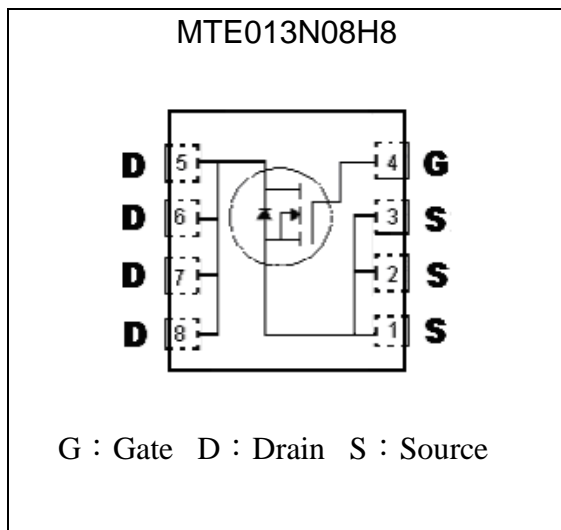
## MTE013N08H8

### Features

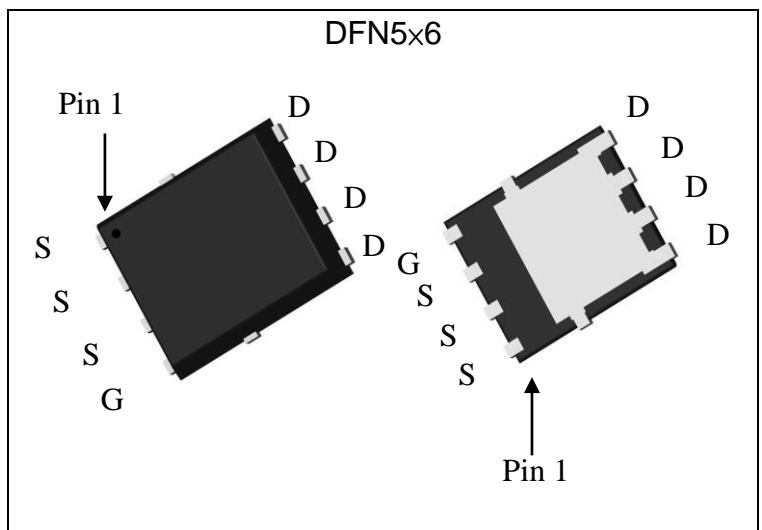
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

$BV_{DSS}$	80V
$I_D @ V_{GS}=10V, T_C=25^{\circ}C$ (silicon limit)	49A
$I_D @ V_{GS}=10V, T_C=25^{\circ}C$ (package limit)	44A
$I_D @ V_{GS}=10V, T_A=25^{\circ}C$	9.3A
$R_{DS(ON)(typ)} @ V_{GS}=10V, I_D=10A$	10.5 m $\Omega$

### Symbol

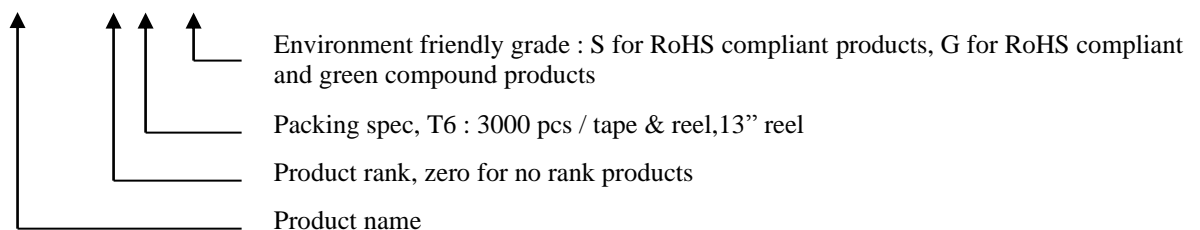


### Outline



### Ordering Information

Device	Package	Shipping
MTE013N08H8-0-T6-G	DFN5x6 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel



**Absolute Maximum Ratings** ( $T_C=25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Drain-Source Voltage (Note 1)	$V_{DS}$	80	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current @ $T_C=25^\circ\text{C}$ , $V_{GS}=10\text{V}$ (silicon limit) (Note 4)	$I_D$	49	A
Continuous Drain Current @ $T_C=25^\circ\text{C}$ , $V_{GS}=10\text{V}$ (package limit) (Note 4)		44	
Continuous Drain Current @ $T_C=100^\circ\text{C}$ , $V_{GS}=10\text{V}$		30	
Continuous Drain Current @ $T_A=25^\circ\text{C}$ , $V_{GS}=10\text{V}$ (Note 2)	$I_{DSM}$	9.3	
Continuous Drain Current @ $T_A=70^\circ\text{C}$ , $V_{GS}=10\text{V}$ (Note 2)		7.5	
Pulsed Drain Current (Note 1)	$I_{DM}$	160	
Single Pulse Avalanche Current @ $L=0.1\text{mH}$	$I_{AS}$	15	
Single Pulse Avalanche Energy @ $L=0.5\text{mH}$ (Note 3)	$E_{AS}$	56	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	69
		$T_C=100^\circ\text{C}$	27
	$P_{DSM}$	$T_A=25^\circ\text{C}$ (Note 2)	2.5
		$T_A=70^\circ\text{C}$ (Note 2)	1.6
Operating Junction and Storage Temperature	$T_j, T_{stg}$	-55~+150	

\*Drain current limited by maximum junction temperature

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	1.8	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-ambient, max (Note 2)	$R_{\theta JA}$	50	

Note : 1. Pulse width limited by junction temperature.

- Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board, 125 $^\circ\text{C}/\text{W}$  when mounted on minimum copper pad
- Ratings are based on low frequency and low duty cycles to keep initial  $T_J=25^\circ\text{C}$ .
- Calculated continuous drain current based on maximum allowable junction temperature.
- The static characteristics are obtained using <300 $\mu\text{s}$  pulses, duty cycle 0.5% maximum.
- The  $R_{\theta JA}$  is the sum of thermal resistance from junction to case  $R_{\theta JC}$  and case to ambient.

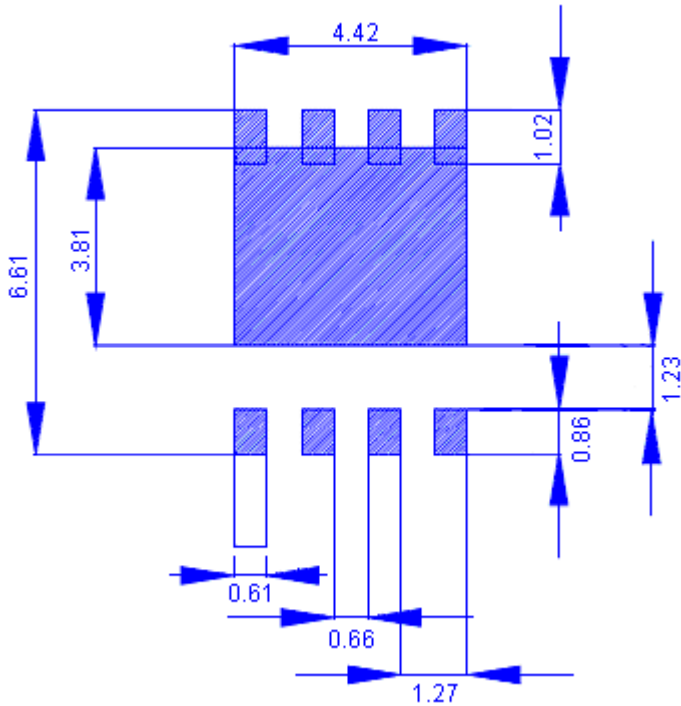


**Characteristics (Tj=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	80	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	68	-	mV/°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>	-	19	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =20A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =64V, V <sub>GS</sub> =0V
	-	-	5		V <sub>DS</sub> =64V, V <sub>GS</sub> =0V, T <sub>j</sub> =55°C
*R <sub>DS(ON)</sub>	-	10.5	13.6	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =10A
<b>Dynamic</b>					
*Q <sub>g</sub> (V <sub>GS</sub> =10V)	-	31.4	-	nC	V <sub>DS</sub> =40V, I <sub>D</sub> =10.5A, V <sub>GS</sub> =10V
*Q <sub>g</sub> (V <sub>GS</sub> =8V)	-	26	-		
*Q <sub>gs</sub>	-	7.3	-		
*Q <sub>gd</sub>	-	10.1	-		
*t <sub>d(ON)</sub>	-	18.6	-	ns	V <sub>DS</sub> =40V, I <sub>D</sub> =10.5A, V <sub>GS</sub> =10V, R <sub>GS</sub> =6Ω
*t <sub>r</sub>	-	26.2	-		
*t <sub>d(OFF)</sub>	-	46	-		
*t <sub>f</sub>	-	15.8	-		
C <sub>iss</sub>	-	1472	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =30V, f=1MHz
C <sub>oss</sub>	-	200	-		
C <sub>rss</sub>	-	105	-		
R <sub>g</sub>	-	3.8	-	Ω	f=1MHz
<b>Source-Drain Diode</b>					
*I <sub>S</sub>	-	-	40	A	
*I <sub>SM</sub>	-	-	160		
*V <sub>SD</sub>	-	0.74	1.1	V	I <sub>S</sub> =2.8A, V <sub>GS</sub> =0V
*t <sub>rr</sub>	-	24.4	-	ns	V <sub>GS</sub> =0V, I <sub>F</sub> =10.5A, dI <sub>F</sub> /dt=100A/μs
*Q <sub>rr</sub>	-	26.9	-	nC	

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

### Recommended Soldering Footprint

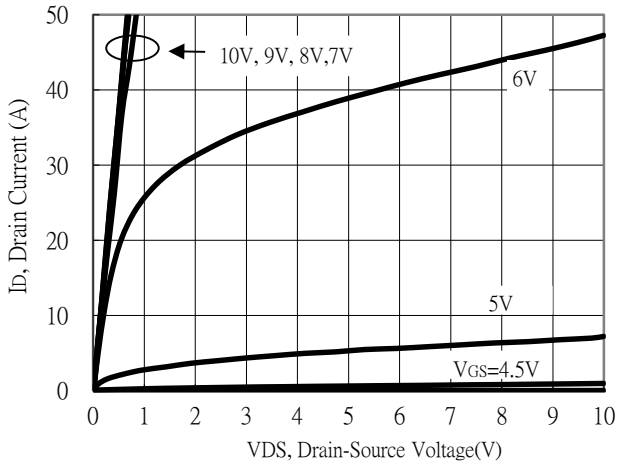


unit : mm

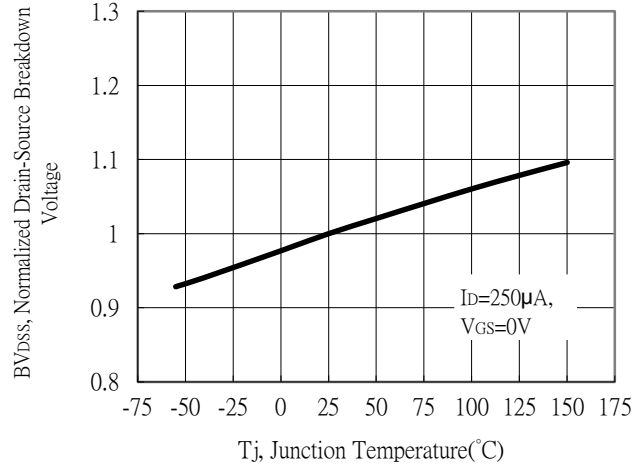


**Typical Characteristics**

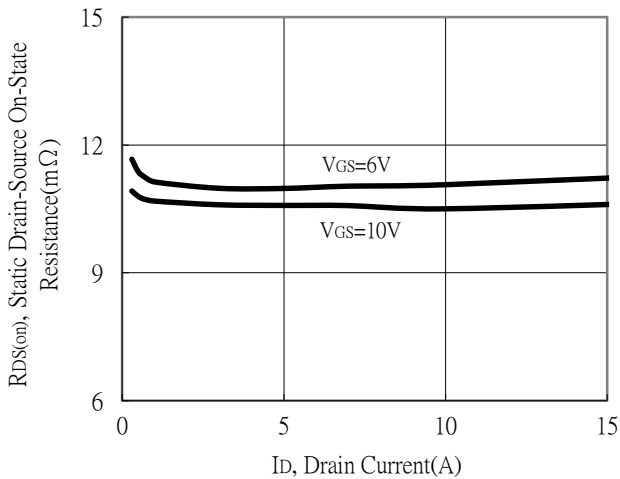
Typical Output Characteristics



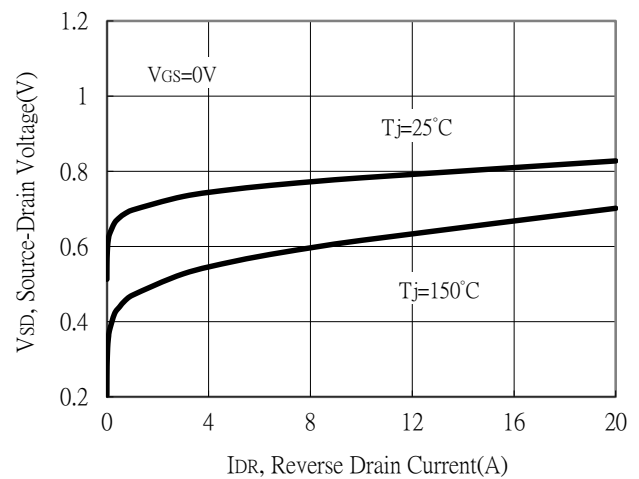
Brekdown Voltage vs Junction Temperature



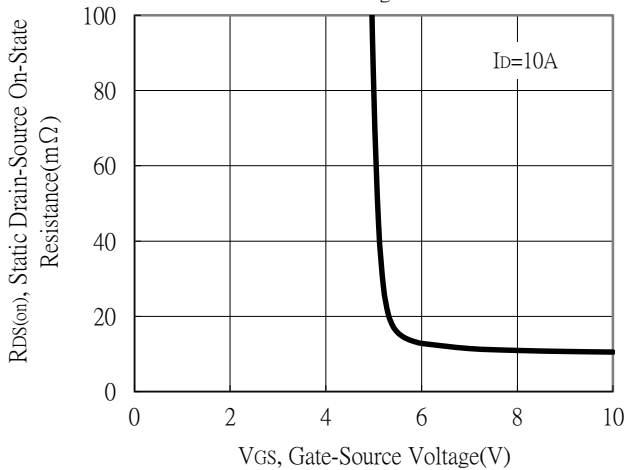
Static Drain-Source On-State resistance vs Drain Current



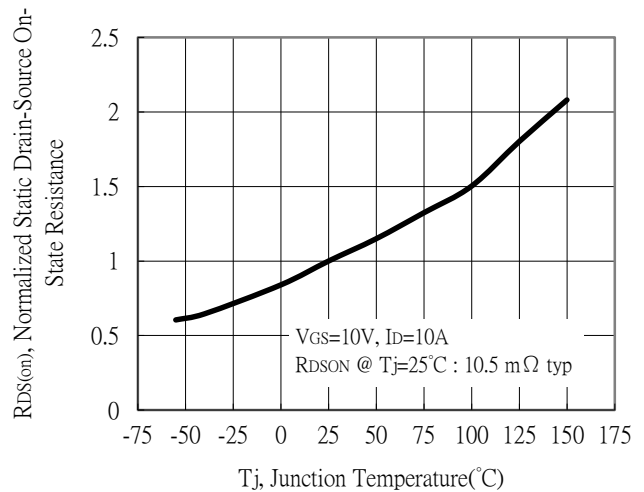
Reverse Drain Current vs Source-Drain Voltage



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

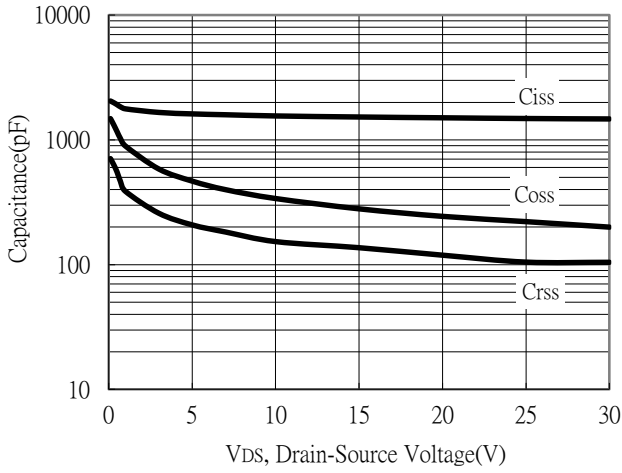


Drain-Source On-State Resistance vs Junction Temperature

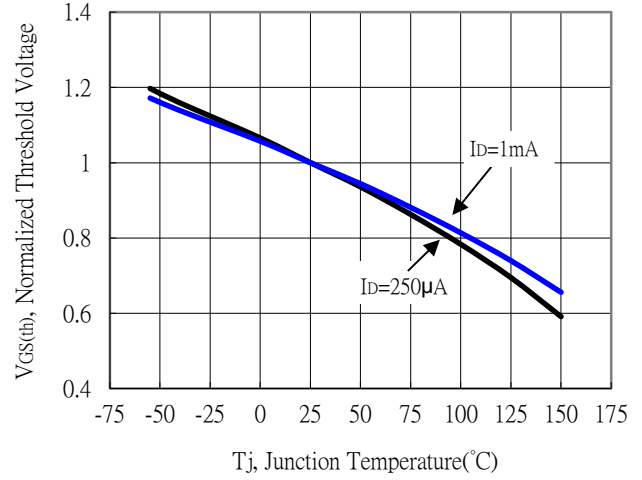


**Typical Characteristics(Cont.)**

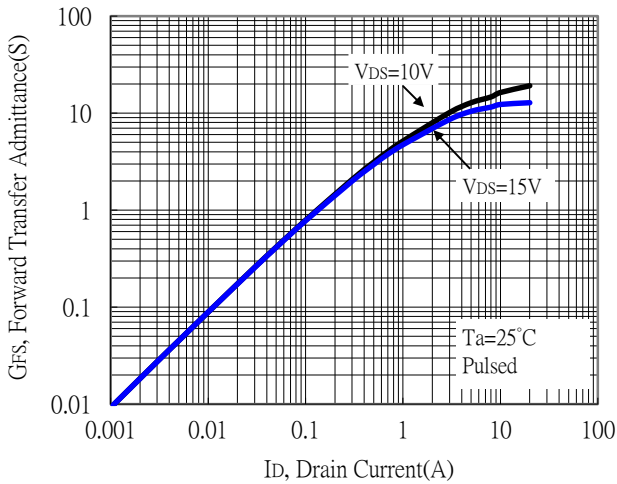
Capacitance vs Drain-to-Source Voltage



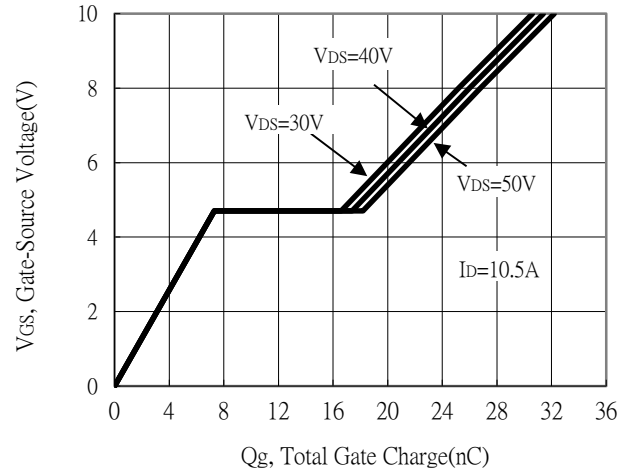
Threshold Voltage vs Junction Temperature



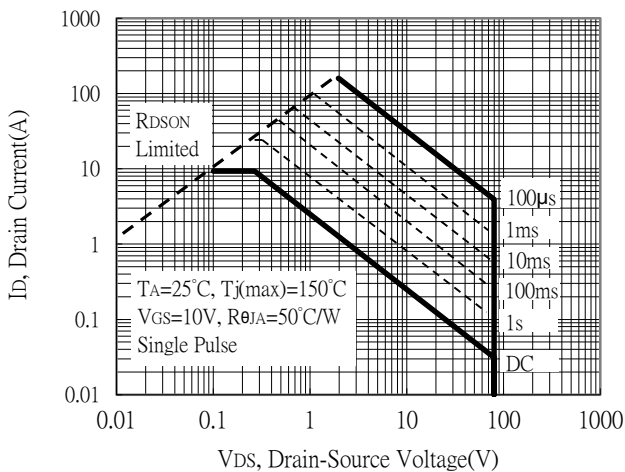
Forward Transfer Admittance vs Drain Current



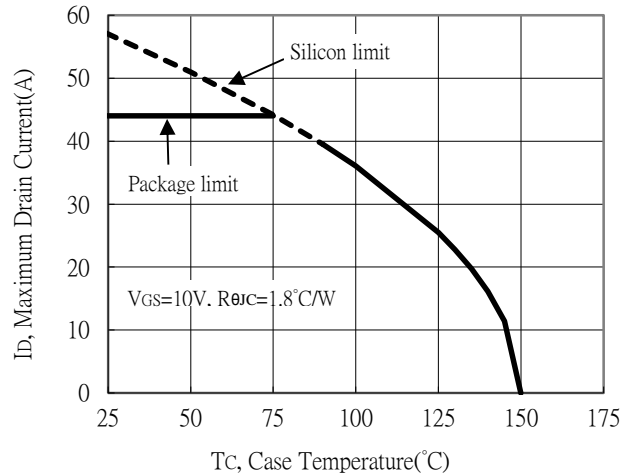
Gate Charge Characteristics



Maximum Safe Operating Area

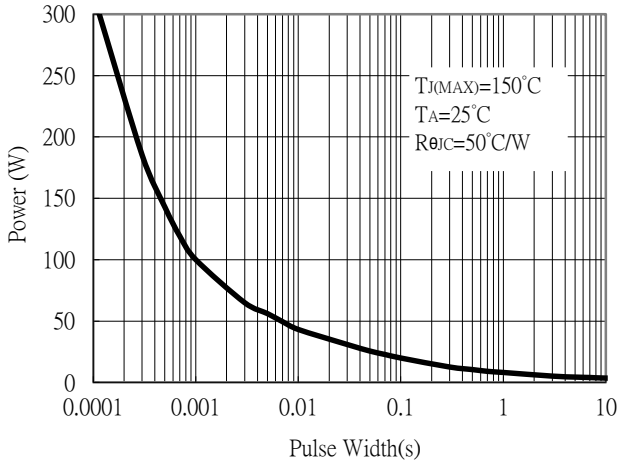


Maximum Drain Current vs Case Temperature

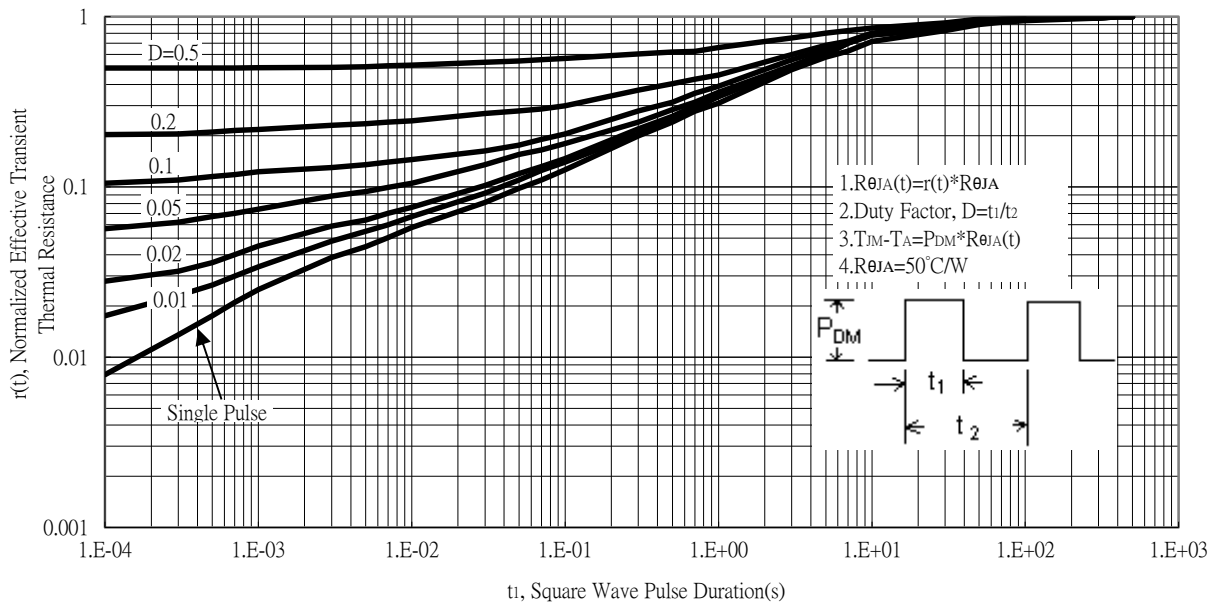


**Typical Characteristics(Cont.)**

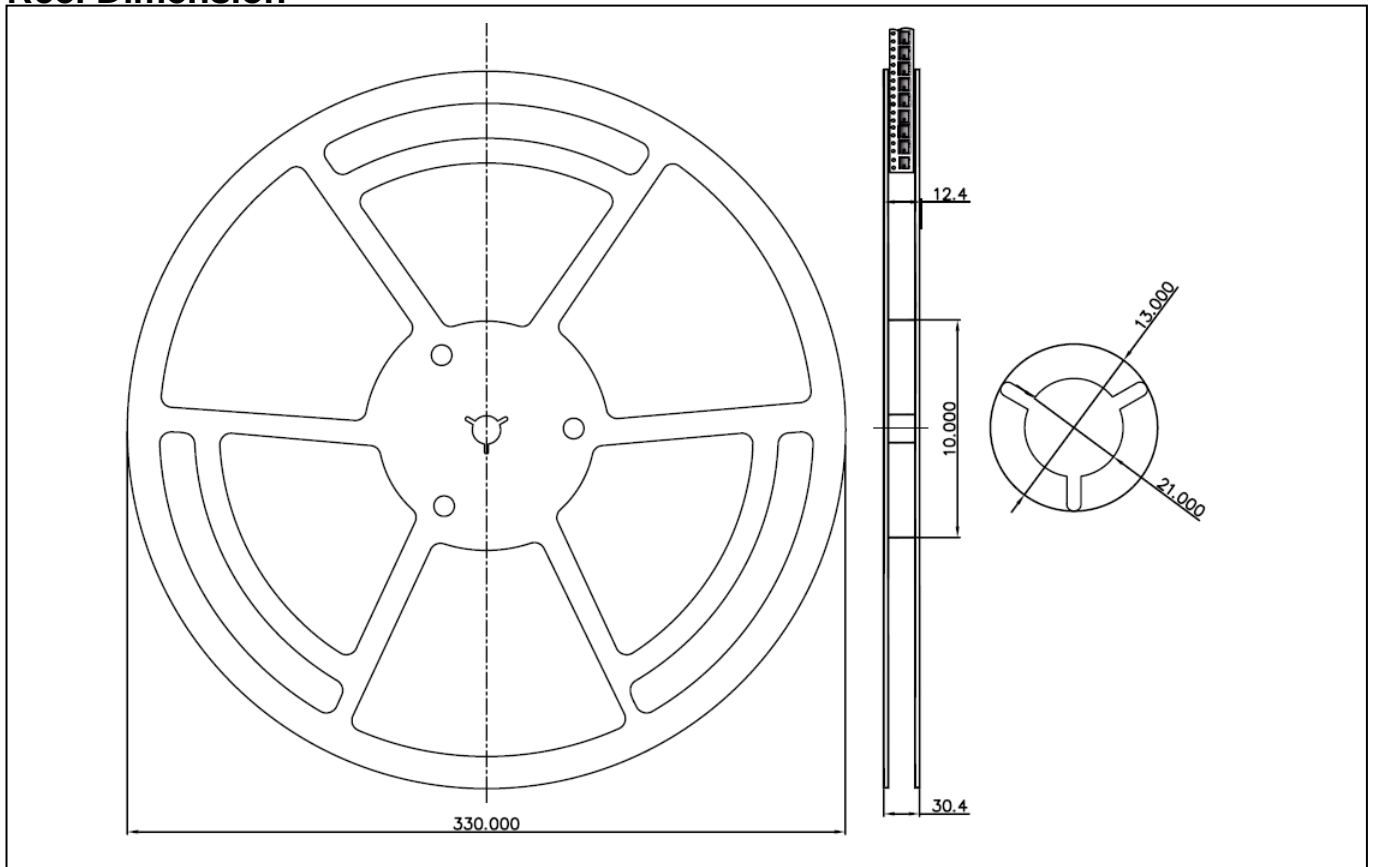
Single Pulse Power Rating, Junction to Case



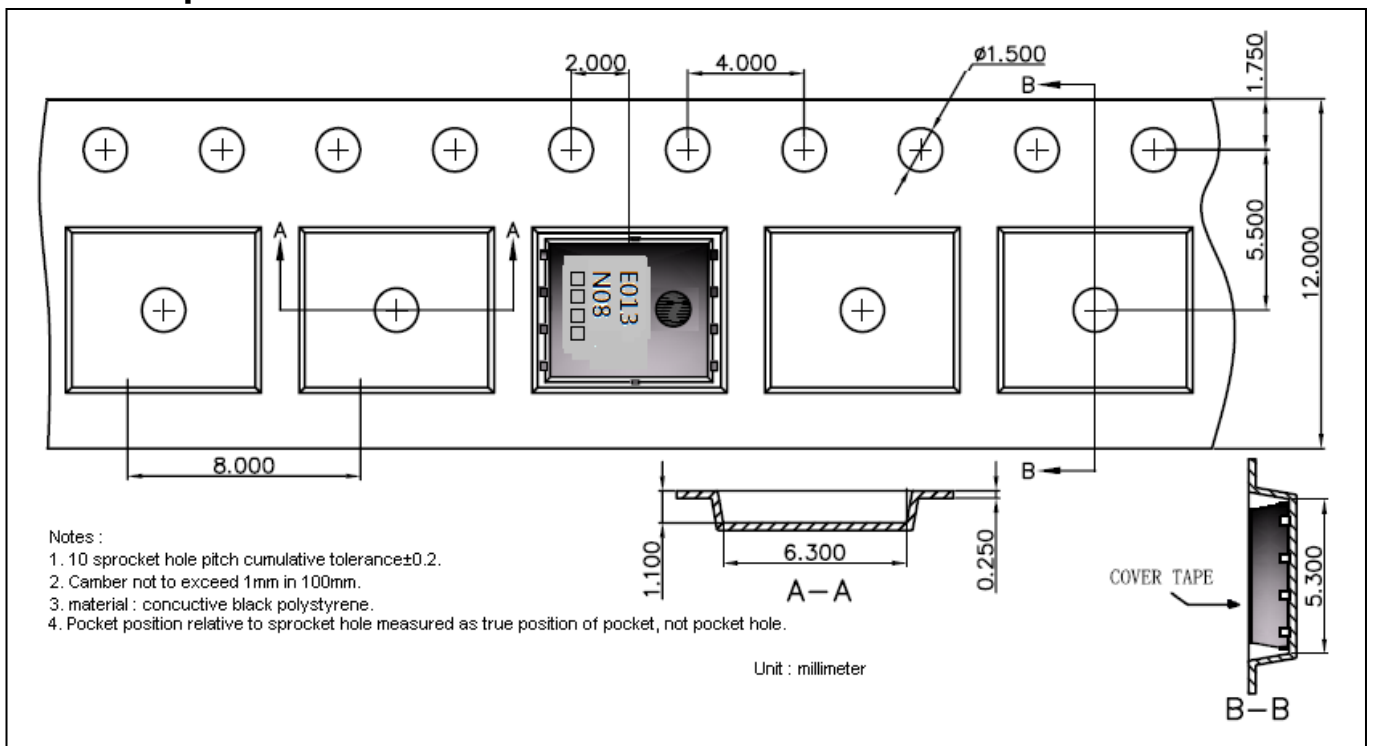
Transient Thermal Response Curves



**Reel Dimension**



**Carrier Tape Dimension**

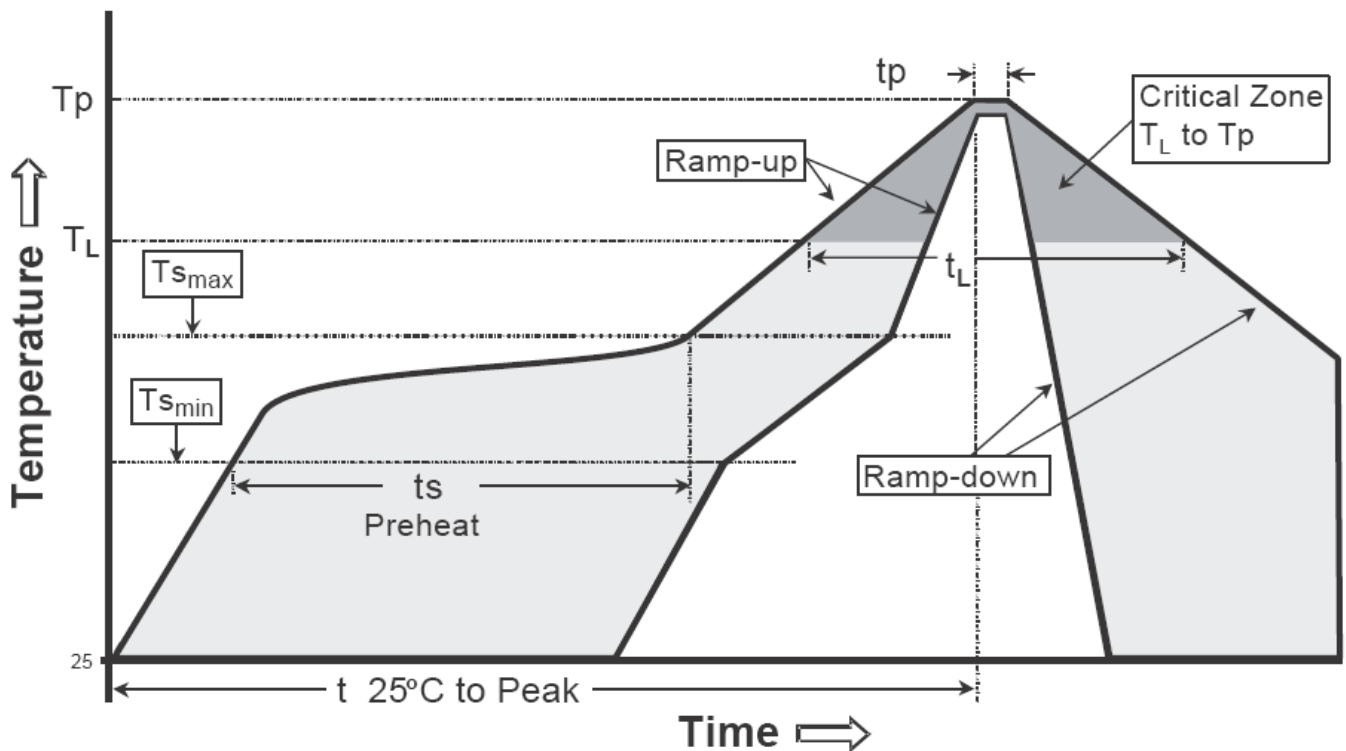




**Recommended wave soldering condition**

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 (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.

## DFN5x6 Dimension

**8-Lead DFN5x6 Plastic Package**  
 CYS Package Code : H8

**Marking:**

Device Code → **E013**  
 N08

Date Code → □□□□ X

Assembly site code :  
 blank : site 1  
 G : site 2

Date code : (From left to right)  
 First code : Year code, the last digit of Christine year.  
 For example, 2017→7, 2018→8, 2019→9, ..., etc.  
 Second code : Month code, Jan→A, Feb→B, Mar→C, Apr→D,  
 May→E, Jun→F, Jul→G, Aug→H, Sep→J, Oct→K,  
 Nov→L, Dec→M  
 Third and fourth codes : production serial number, 01~99

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.90	1.10	0.035	0.043	E2	3.37	3.78	0.133	0.149
A1	0.00	0.05	0.000	0.002	e	1.27	BSC	0.050	BSC
b	0.33	0.51	0.013	0.020	H	0.41	0.73	0.016	0.029
C	0.20	0.30	0.008	0.012	K	1.10	-	0.043	-
D1	4.80	5.00	0.189	0.197	L	0.51	0.71	0.020	0.028
D2	3.67	4.11	0.144	0.162	L1	0.06	0.20	0.002	0.008
E	5.90	6.13	0.232	0.241	θ	8°	12°	8°	12°
E1	5.67	5.83	0.223	0.230					

**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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