

# N-Channel Enhancement Mode Power MOSFET

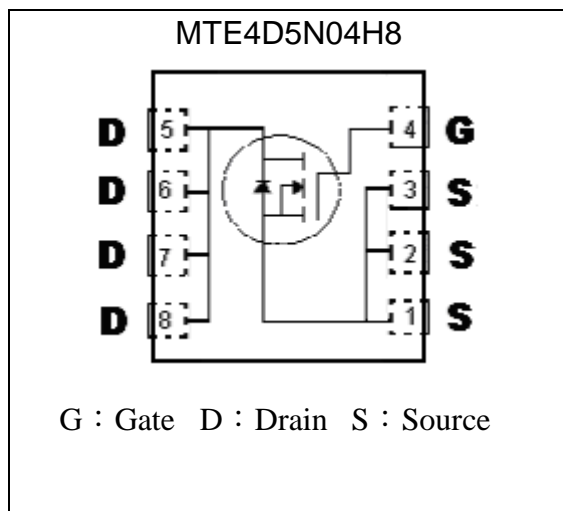
## MTE4D5N04H8

### Features

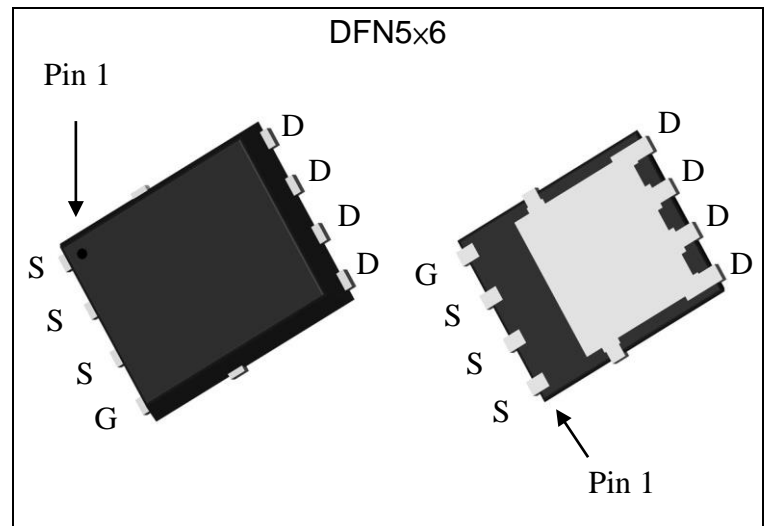
- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- Pb-free lead plating and Halogen-free package

<b>BV<sub>DSS</sub></b>	<b>40V</b>
<b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>C</sub>=25°C</b>	<b>74A(silicon limit)</b>
<b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>A</sub>=25°C</b>	<b>16.5A</b>
<b>R<sub>DS(ON)</sub> @ V<sub>GS</sub>=10V, I<sub>D</sub>=30A</b>	<b>3.8mΩ (typ.)</b>

### Symbol

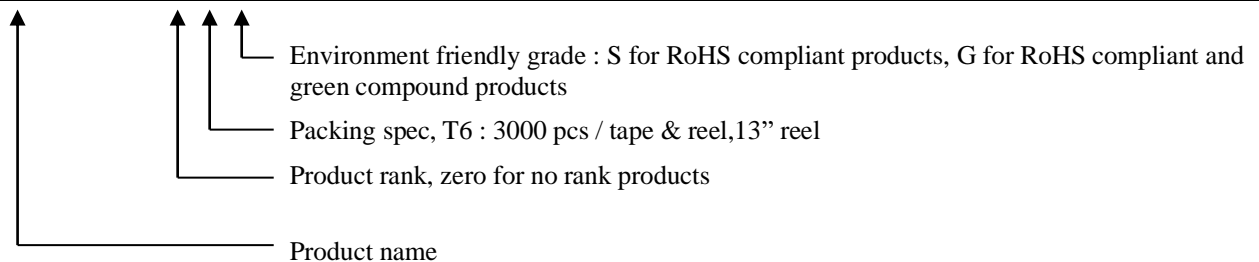


### Outline



### Ordering Information

Device	Package	Shipping
MTE4D5N04H8-0-T6-G	DFN 5 ×6 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel





**Absolute Maximum Ratings (Ta=25°C)**

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, V <sub>GS</sub> =10V (silicon limit)	I <sub>D</sub>	74	A	
Continuous Drain Current @ T <sub>C</sub> =25°C, V <sub>GS</sub> =10V (package limit)		60		
Continuous Drain Current @ T <sub>C</sub> =100°C, V <sub>GS</sub> =10V		46.8		
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =10V	I <sub>DSM</sub>	16.5 *3		
Continuous Drain Current @ T <sub>A</sub> =70°C, V <sub>GS</sub> =10V		13.2 *3		
Pulsed Drain Current	I <sub>DM</sub>	296 *1, 2		
Avalanche Current @ L=0.1mH	I <sub>AS</sub>	60		
Avalanche Energy @ L=1mH	E <sub>AS</sub>	338	mJ	
Total Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	50	W
		T <sub>C</sub> =100°C	20	
	P <sub>D</sub> SM	T <sub>A</sub> =25°C	2.5 *3	
		T <sub>A</sub> =70°C	1.6 *3	
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	R <sub>θJA</sub>	50 *3	

- Note : 1.Pulse width limited by maximum junction temperature.  
 2.Duty cycle≤1%.  
 3.Surface mounted on 1in2 copper pad of FR-4 board, t≤10s; 125 °C/W when mounted on minimum copper pad.

**Characteristics (Tc=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> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	2	-	4		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub> *1	-	18	-	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> =32V, V <sub>GS</sub> =0V
	-	-	5		V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>j</sub> =55°C
R <sub>DS(ON)</sub> *1	-	3.8	5.8	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =30A
<b>Dynamic</b>					
C <sub>iss</sub>	-	2582	3356	pF	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	261	339		
C <sub>rss</sub>	-	169	220		



Qg *1, 2	-	52.2	-	nC	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A
Qgs *1, 2	-	15	-		
Qgd *1, 2	-	11.1	-		
t <sub>d(ON)</sub> *1, 2	-	24	-	ns	V <sub>DD</sub> =20V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V, R <sub>GS</sub> =3.5 Ω
tr *1, 2	-	11.4	-		
t <sub>d(OFF)</sub> *1, 2	-	58.4	-		
t <sub>f</sub> *1, 2	-	12	-		
Rg	-	0.9	-	Ω	f=1MHz

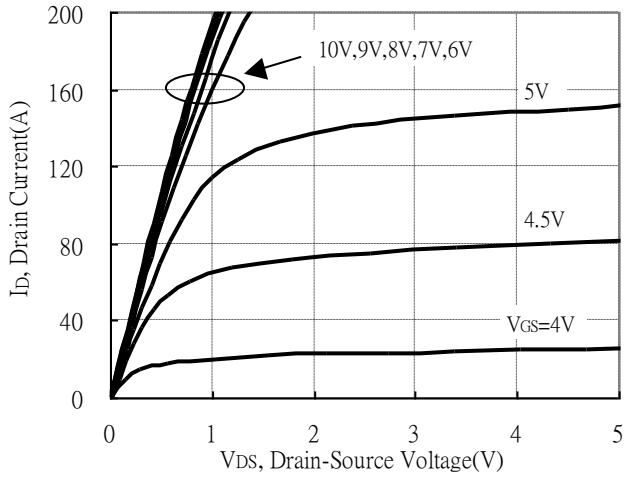
**Source-Drain Diode**

I <sub>S</sub> *1	-	-	40	A	
I <sub>SM</sub> *3	-	-	160		
V <sub>SD</sub> *1	-	0.83	1.2	V	I <sub>S</sub> =30A, V <sub>GS</sub> =0V
trr	-	14.9	-	ns	I <sub>F</sub> =50A, dI <sub>F</sub> /dt=100A/μs
Qrr	-	10.2	-	nC	

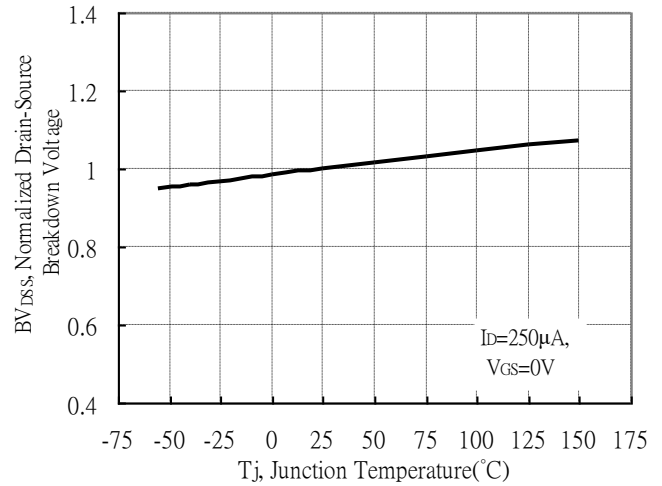
Note : \*1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%  
\*2.Independent of operating temperature  
\*3.Pulse width limited by maximum junction temperature.

## Typical Characteristics

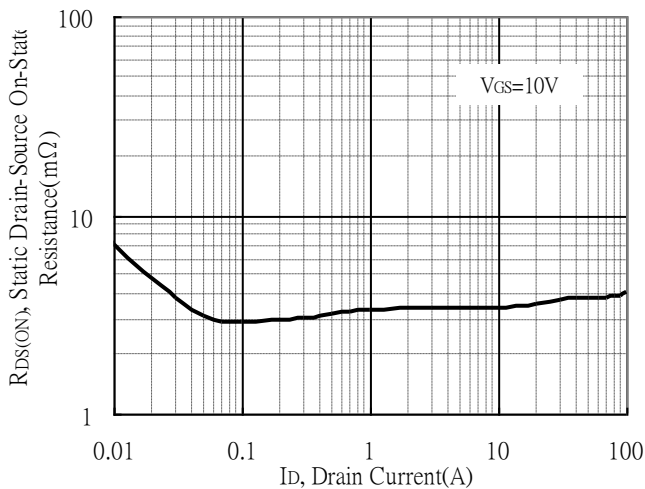
Typical Output Characteristics



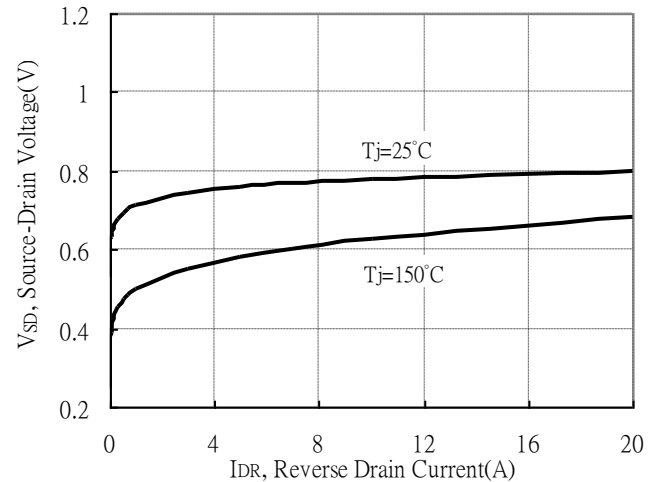
Brekdwn Voltage vs Ambient Temperature



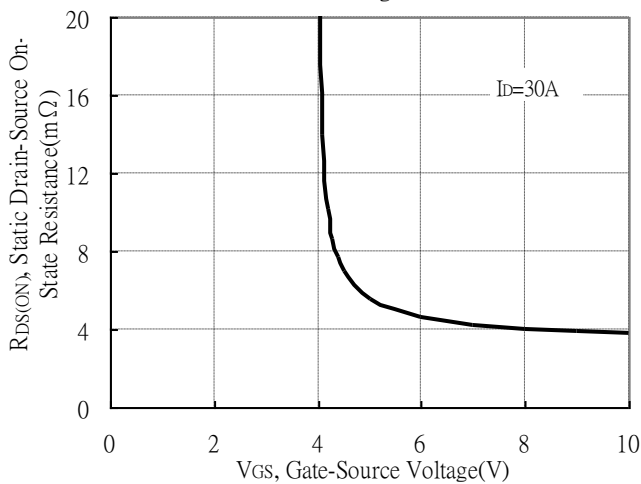
Static Drain-Source On-State resistance vs Drain Current



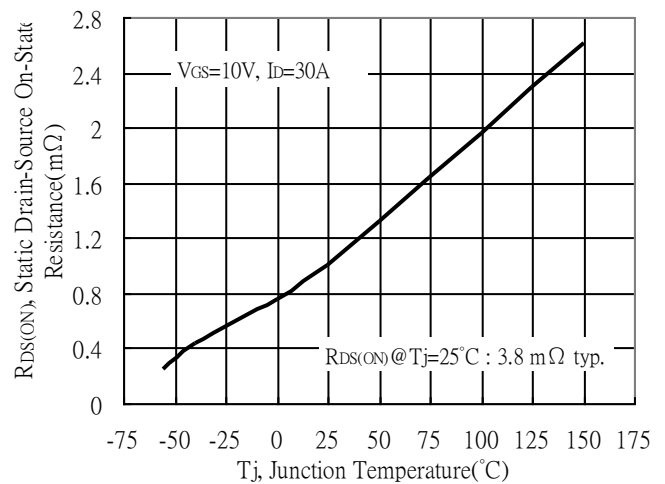
Reverse Drain Current vs Source-Drain Voltage



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

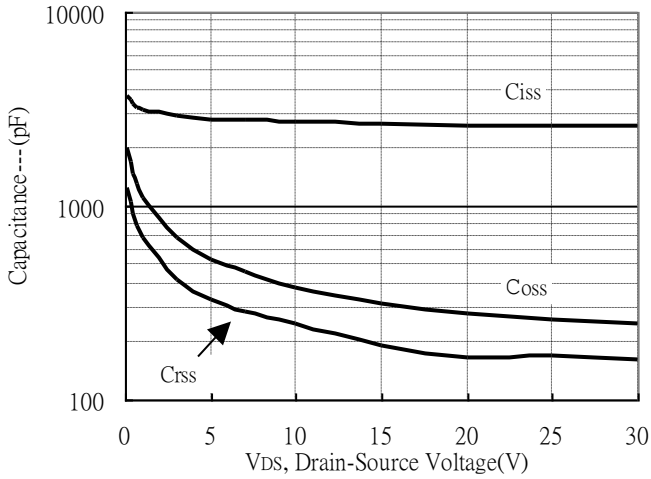


Drain-Source On-State Resistance vs Junction Temperature

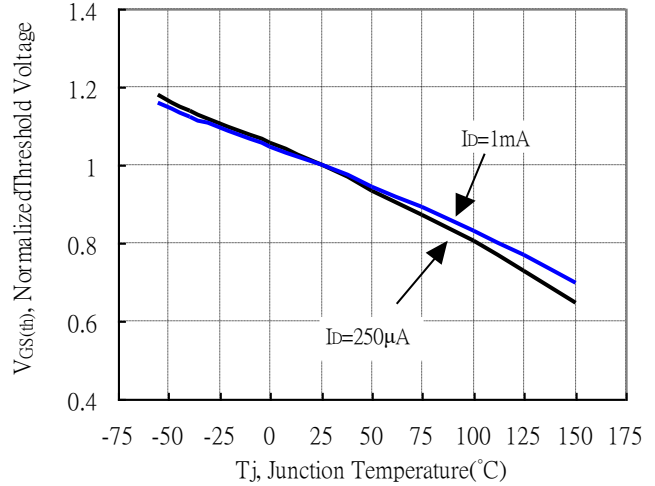


**Typical Characteristics(Cont.)**

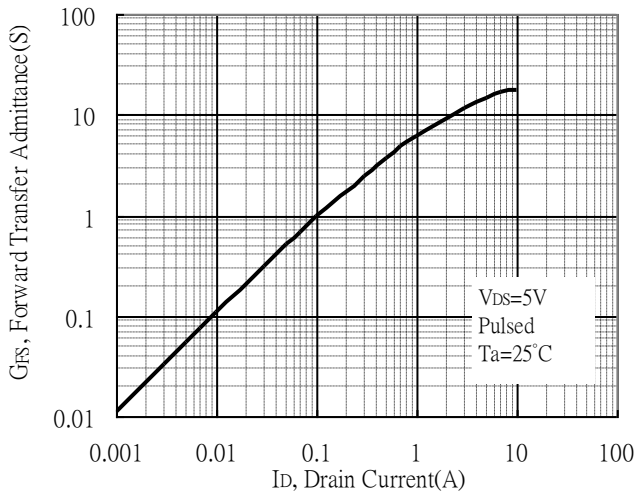
Capacitance vs Drain-to-Source Voltage



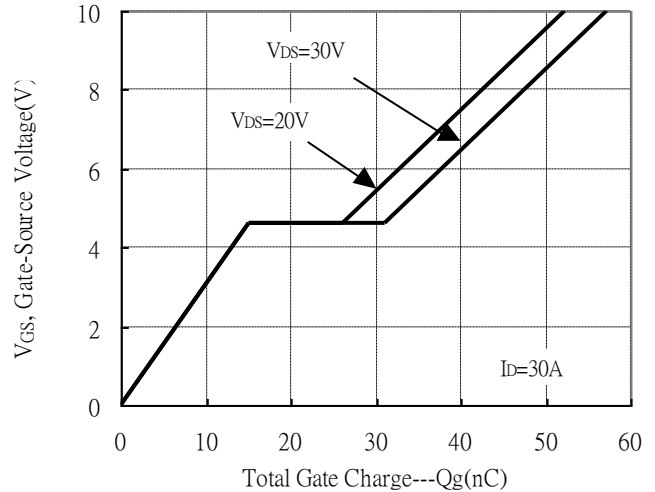
Threshold Voltage vs Junction Temperature



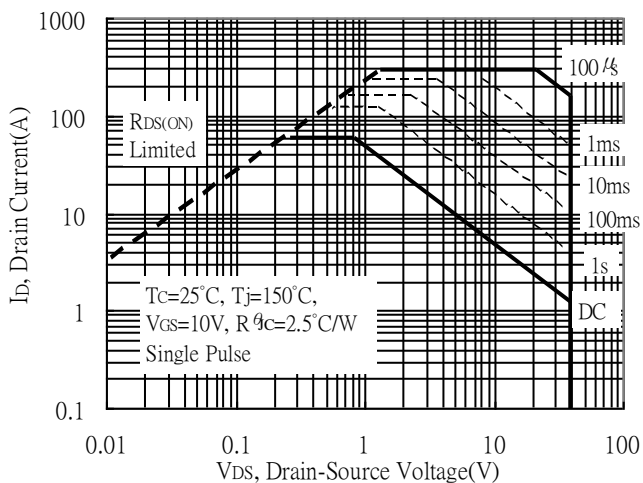
Forward Transfer Admittance vs Drain Current



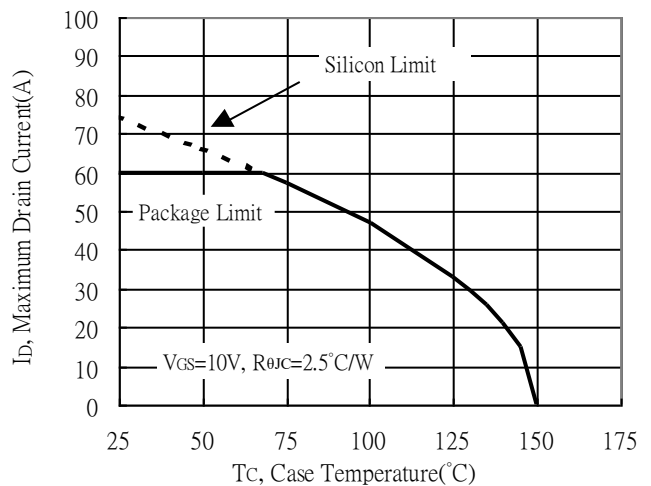
Gate Charge Characteristics



Maximum Safe Operating Area

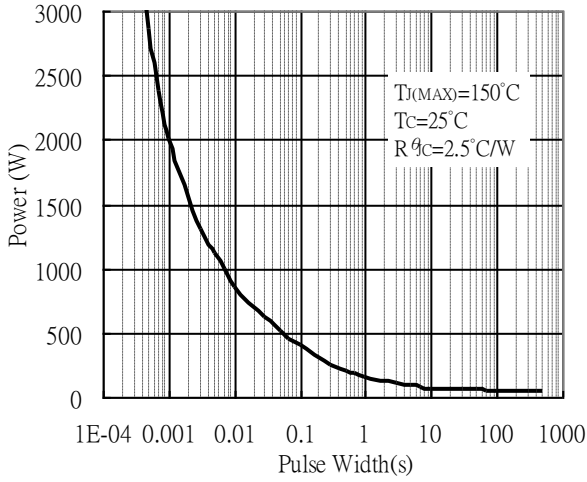


Maximum Drain Current vs Case Temperature

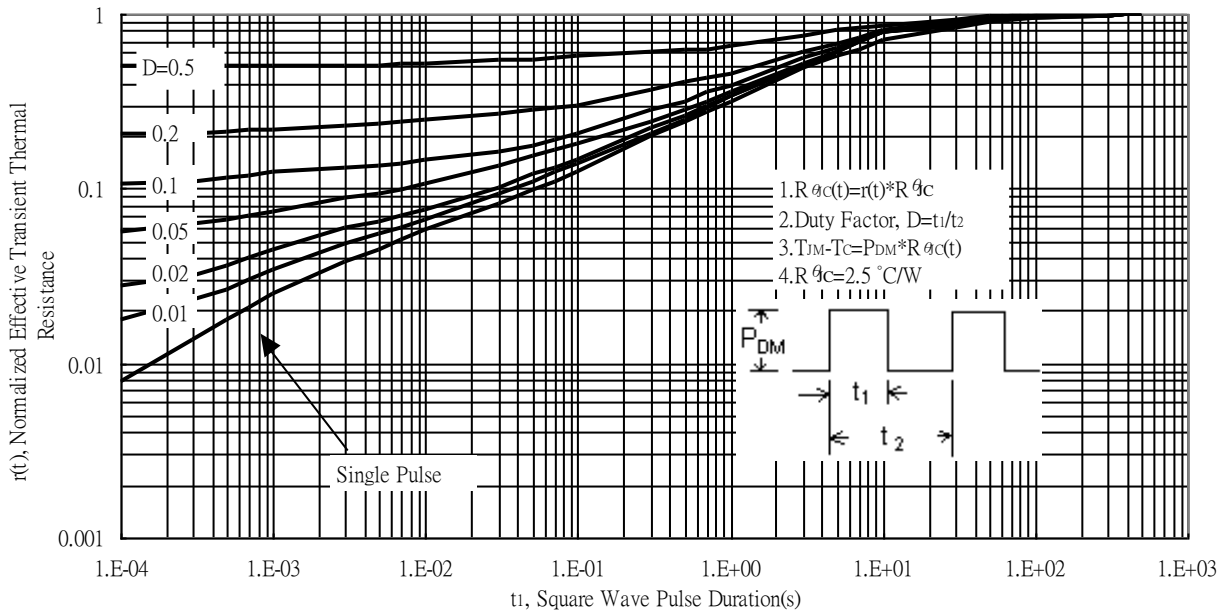


**Typical Characteristics(Cont.)**

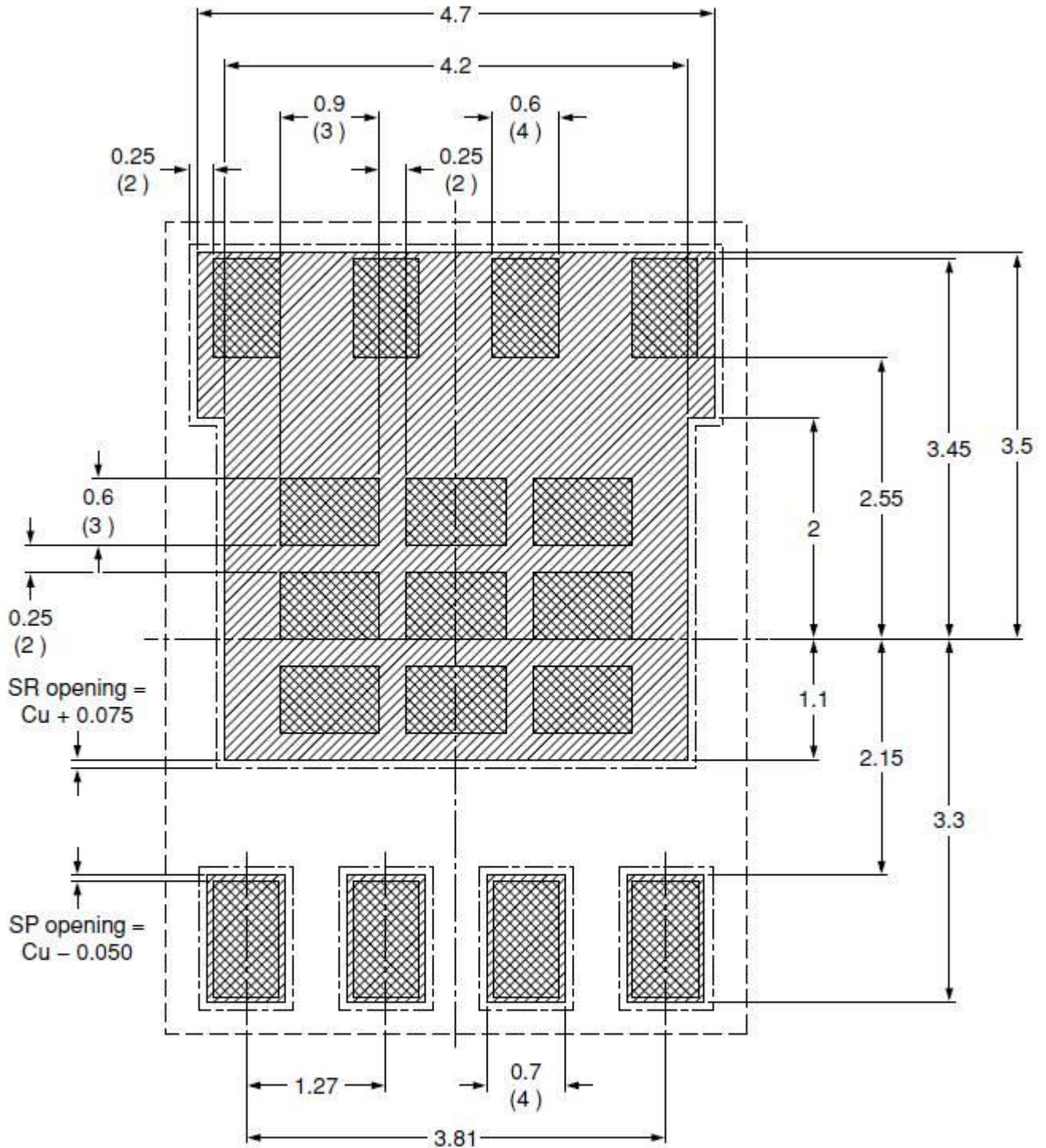
Single Pulse Maximum Power Dissipation



Transient Thermal Response Curves



**Recommended Soldering Footprint & Stencil Design**

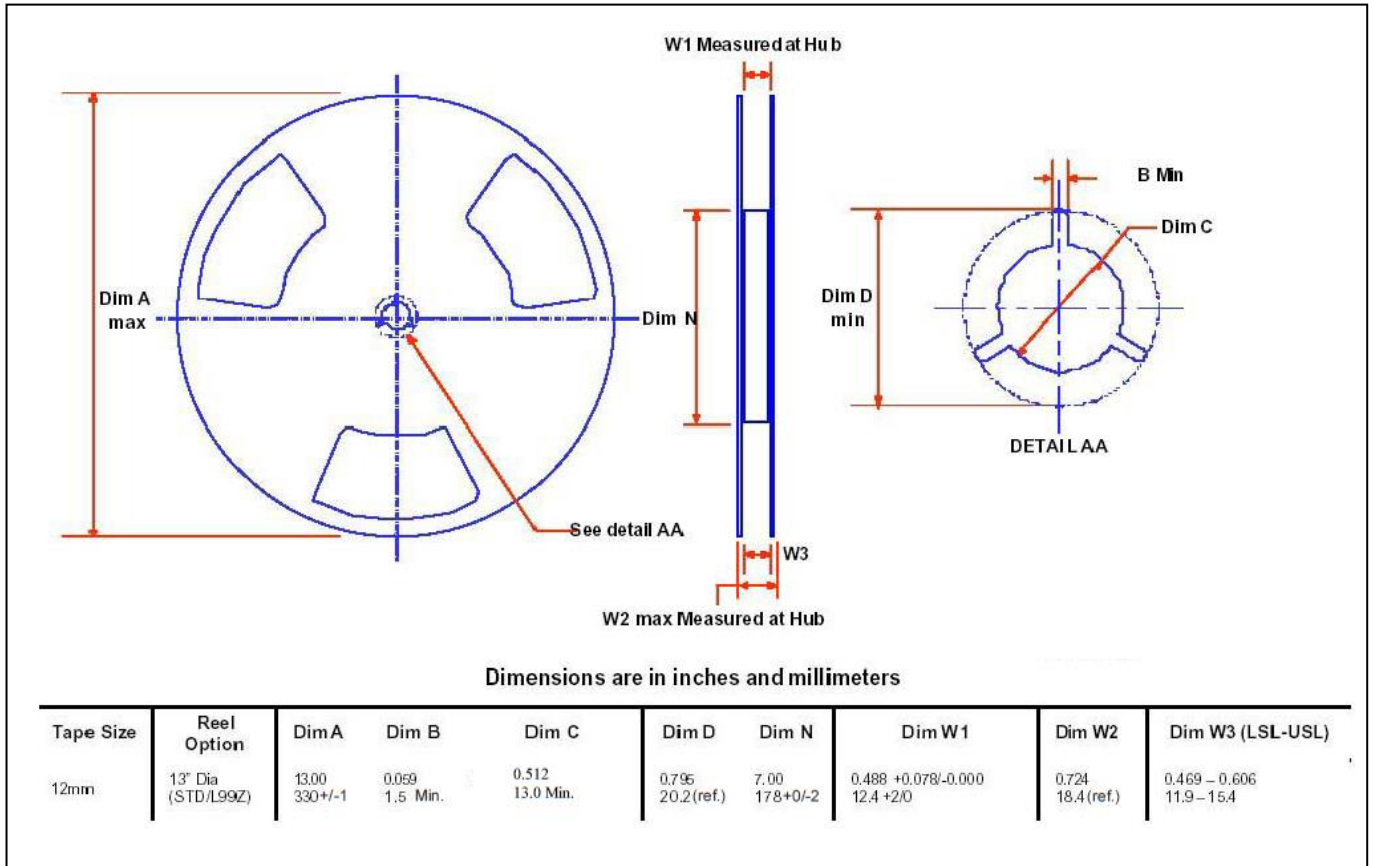


- |   |  |
|---|--|
|  solder lands  |  solder paste<br>125 µm stencil |
|  solder resist |  occupied area                  |

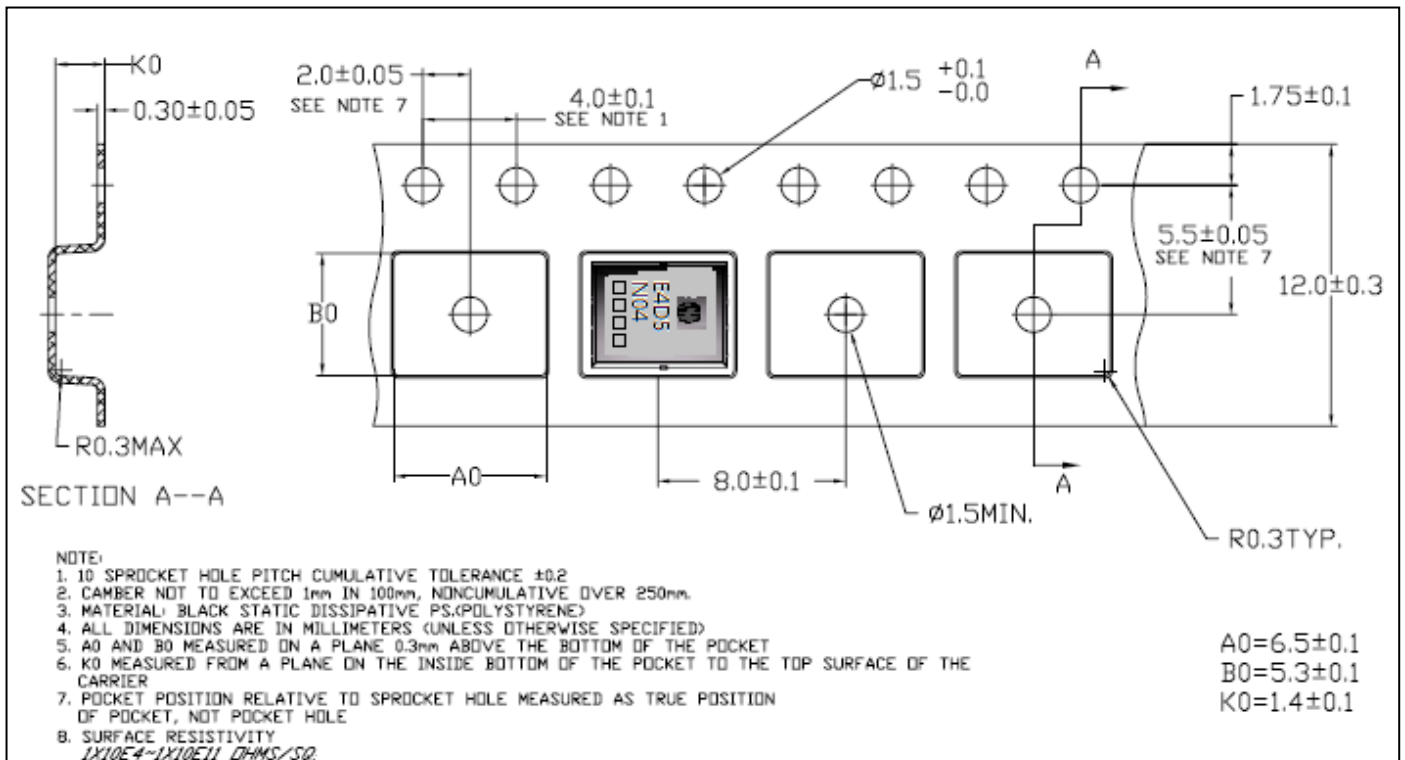
unit : mm



**Reel Dimension**



**Carrier Tape Dimension**

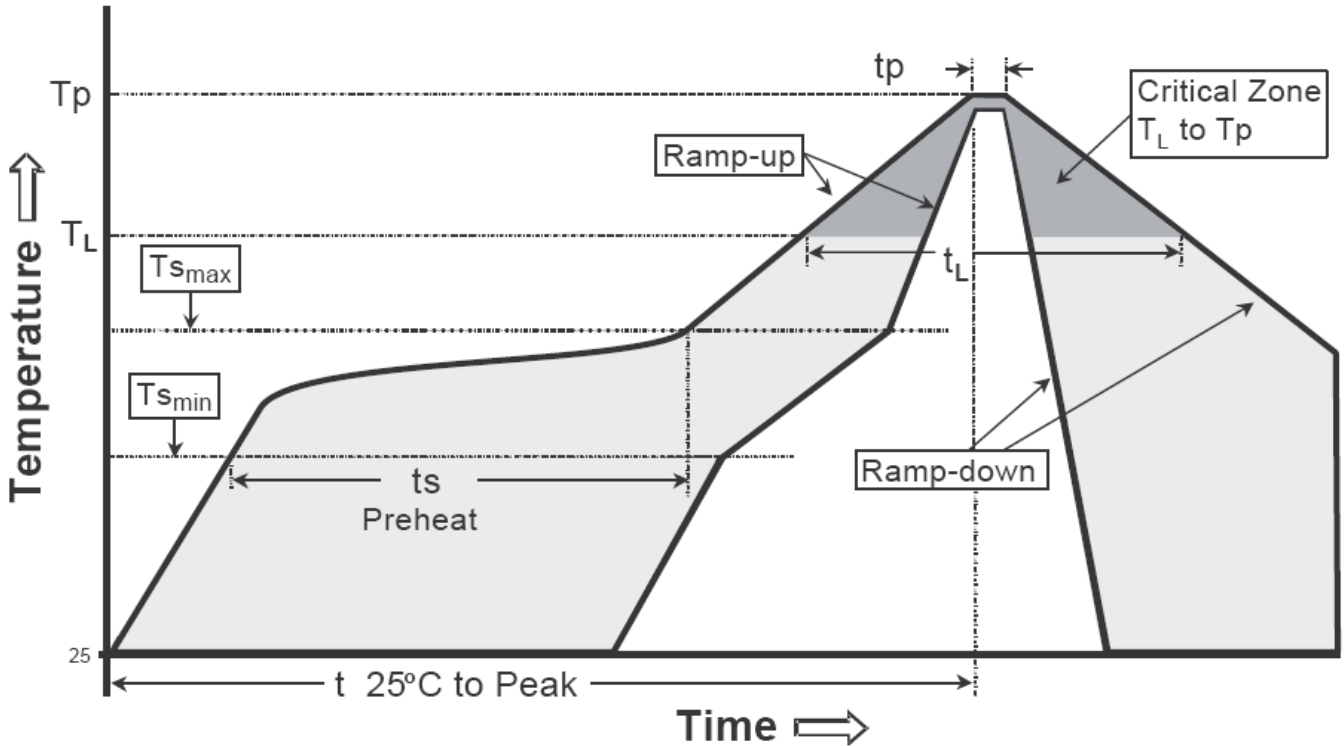




**Recommended wave soldering condition**

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

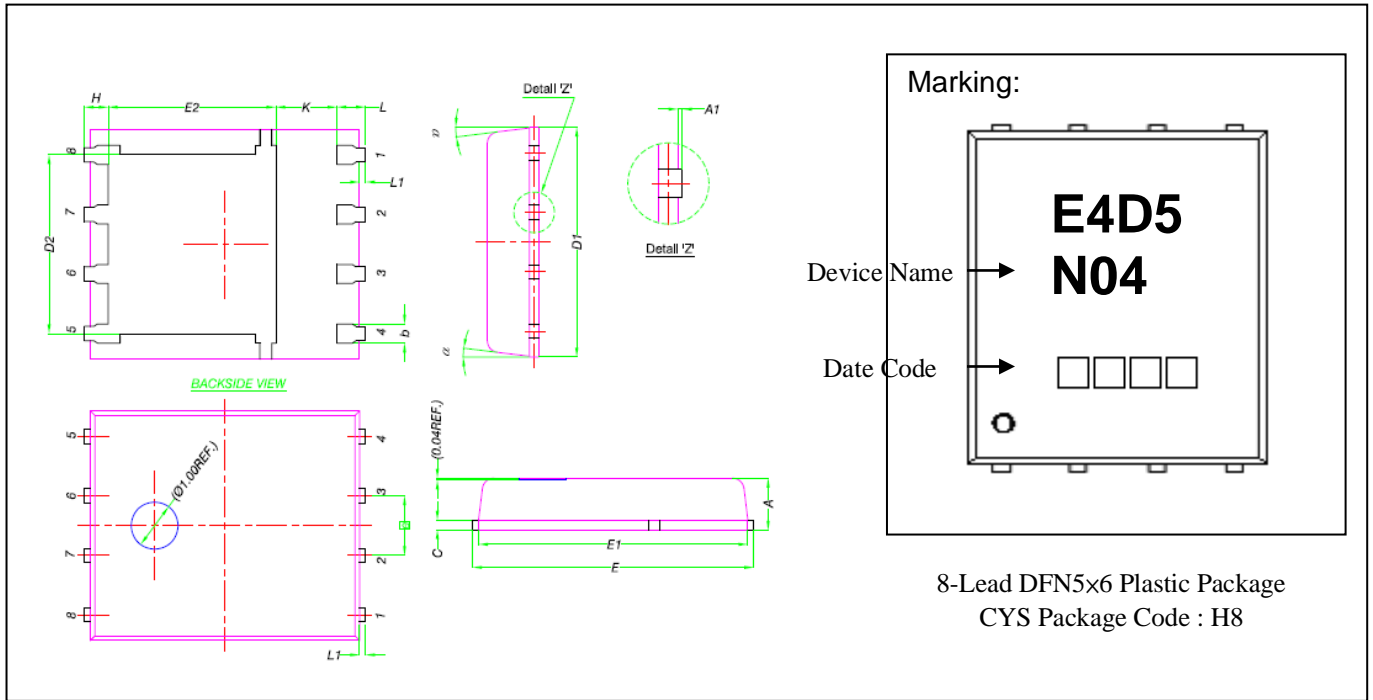
**Recommended temperature profile for IR reflow**



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.

**DFN5x6 Dimension**



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.90	1.10	0.035	0.043	E2	3.38	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	0.61	0.016	0.024
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	3.61	3.96	0.142	0.156	L1	0.06	0.20	0.002	0.008
E	5.90	6.10	0.232	0.240	θ	8°	12°	8°	12°
E1	5.70	5.80	0.224	0.228					

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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