

**P-Channel Enhancement Mode Power MOSFET**

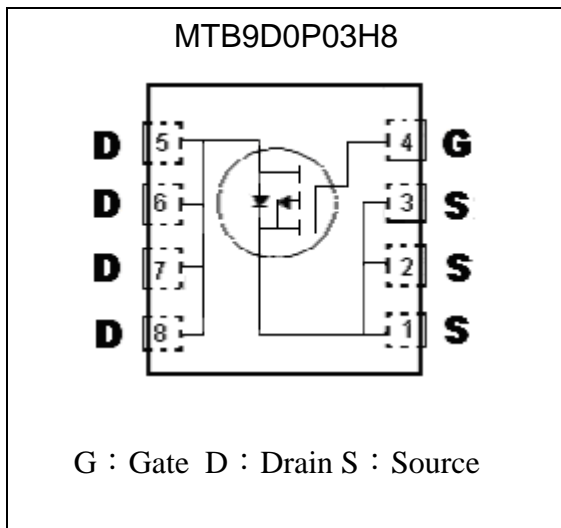
# MTB9D0P03H8

BV <sub>DSS</sub>		-30V
I <sub>D</sub> @V <sub>GS</sub> =-10V, T <sub>C</sub> =25°C		-59A
I <sub>D</sub> @V <sub>GS</sub> =-10V, T <sub>A</sub> =25°C		-19.5A
R <sub>DSON(TYP)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	7.3mΩ
	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-12A	12mΩ

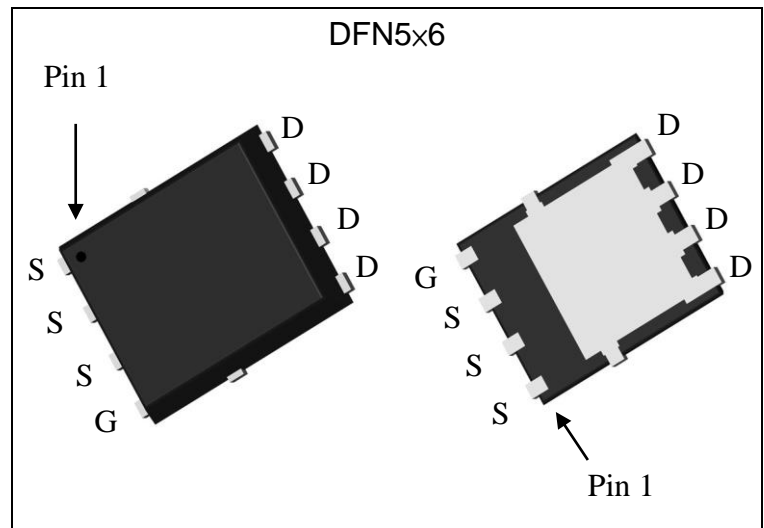
**Features**

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

**Symbol**

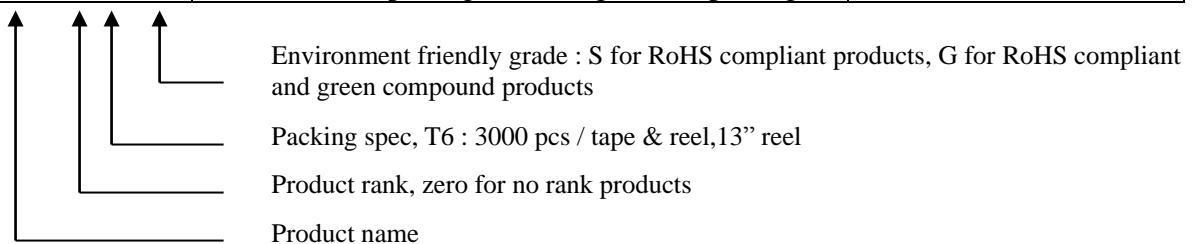


**Outline**



**Ordering Information**

Device	Package	Shipping
MTB9D0P03H8-0-T6-G	DFN5x6 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel





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

Parameter	Symbol	10s	Steady State	Unit	
Drain-Source Voltage	V <sub>DS</sub>	-30		V	
Gate-Source Voltage	V <sub>GS</sub>	±20			
Continuous Drain Current @ T <sub>C</sub> =25°C, V <sub>GS</sub> =-10V (Note1)	I <sub>D</sub>	-59		A	
Continuous Drain Current @ T <sub>C</sub> =100°C, V <sub>GS</sub> =-10V (Note1)		-37.3			
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =-10V (Note2)	I <sub>DSM</sub>	-19.5	-11.6		
Continuous Drain Current @ T <sub>A</sub> =70°C, V <sub>GS</sub> =-10V (Note2)		-15.6	-9.3		
Pulsed Drain Current (Note3)	I <sub>DM</sub>	-210			
Avalanche Current @ L=0.1mH (Note4)	I <sub>AS</sub>	-34			
Avalanche Energy @ L=1mH, I <sub>D</sub> =-16A, V <sub>DD</sub> =-15V (Note4)	E <sub>AS</sub>	128		mJ	
Total Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C (Note1)	60		W
		T <sub>C</sub> =100°C (Note1)	24		
	P <sub>D</sub> SM	T <sub>A</sub> =25°C (Note2)	6.5	2.3	
		T <sub>A</sub> =70°C (Note2)	4.5	1.6	
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55~+150		°C	

**Thermal Data**

Parameter	Symbol	Typical	Maximum	Unit
Thermal Resistance, Junction-to-case	R <sub>th,j-c</sub>	2.2	2.5	°C/W
Thermal Resistance, Junction-to-ambient (Note2)	R <sub>th,j-a</sub>	t≤10s	18	
		Steady State	50	65

- Note : 1. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2 oz. copper, in a still air environment with T<sub>A</sub>=25°C. The power dissipation P<sub>D</sub>SM is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
3. Pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
4. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C. 100% tested by conditions of L=0.1mH, I<sub>AS</sub>=-10A, V<sub>GS</sub>=-10V, V<sub>DD</sub>=-15V.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	-30	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA
V <sub>GS(th)</sub>	-1	-	-2.5		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA
G <sub>FS</sub> *1	-	14.7	-	S	V <sub>DS</sub> = -10V, I <sub>D</sub> =-5A
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> = -24V, V <sub>GS</sub> = 0V
	-	-	-10		V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0, T <sub>j</sub> =70°C
R <sub>DS(ON)</sub> *1	-	7.3	10	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> =-20A
	-	12	17		V <sub>GS</sub> = -4.5V, I <sub>D</sub> =-12A



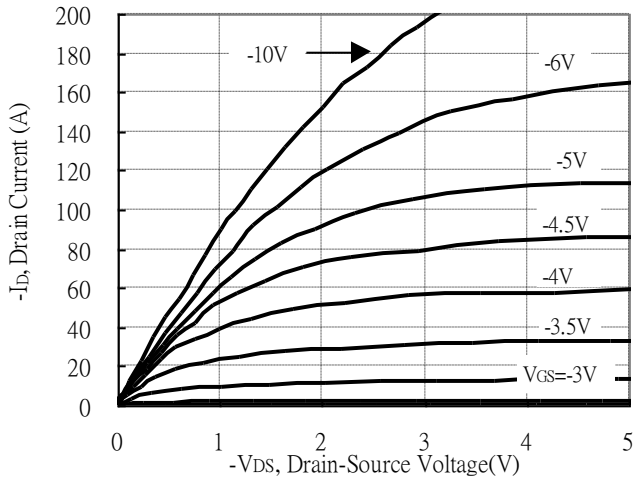
<b>Dynamic *4</b>					
Ciss	-	2177	-	pF	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz
Coss	-	235	-		
Crss	-	171	-		
Qg *1, 2	-	49.6	-	nC	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-12A
Qgs *1, 2	-	7.3	-		
Qgd *1, 2	-	11.4	-		
t <sub>d(ON)</sub> *1, 2	-	14.6	-	ns	V <sub>DS</sub> =-15V, I <sub>D</sub> =-12A, V <sub>GS</sub> =-10V R <sub>G</sub> =1Ω
t <sub>r</sub> *1, 2	-	22.6	-		
t <sub>d(OFF)</sub> *1, 2	-	72.6	-		
t <sub>f</sub> *1, 2	-	16.4	-		
R <sub>g</sub>	-	4	-	Ω	f=1MHz
<b>Source-Drain Diode</b>					
I <sub>S</sub> *1	-	-	-50	A	
I <sub>SM</sub> *3	-	-	-200		
V <sub>SD</sub> *1	-	-0.87	-1.2	V	I <sub>S</sub> =-20A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	32.3	-	ns	I <sub>F</sub> =-1A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	12.9	-	nC	

Note : \*1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%  
 \*2.Independent of operating temperature  
 \*3.Pulse width limited by maximum junction temperature.  
 \*4.Guaranteed by design, not subject to production testing.

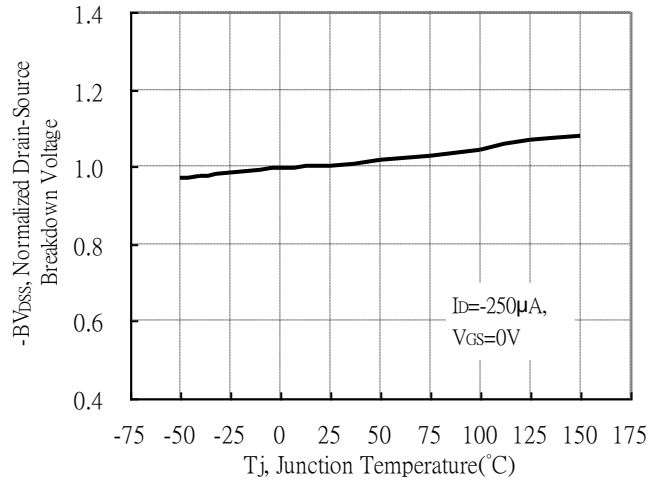


### Typical Characteristics

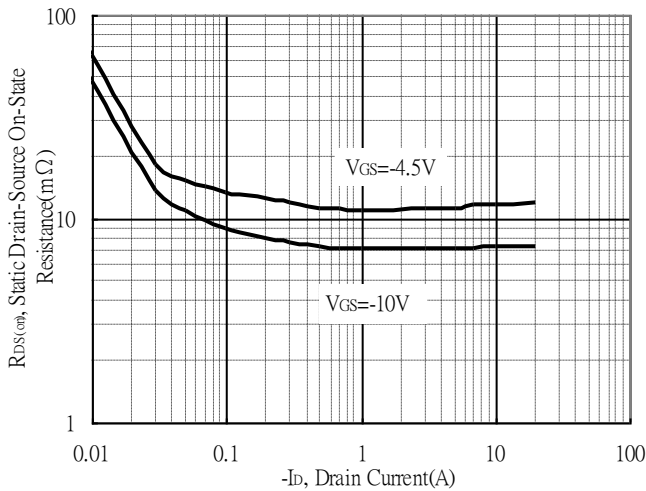
Typical Output Characteristics



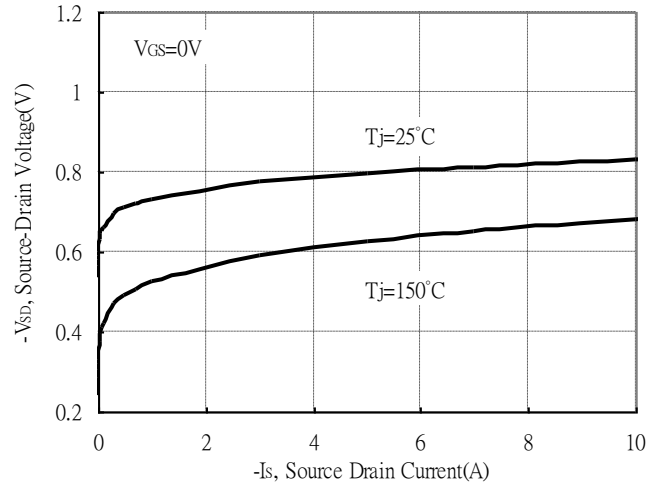
Brekdown Voltage vs Ambient Temperature



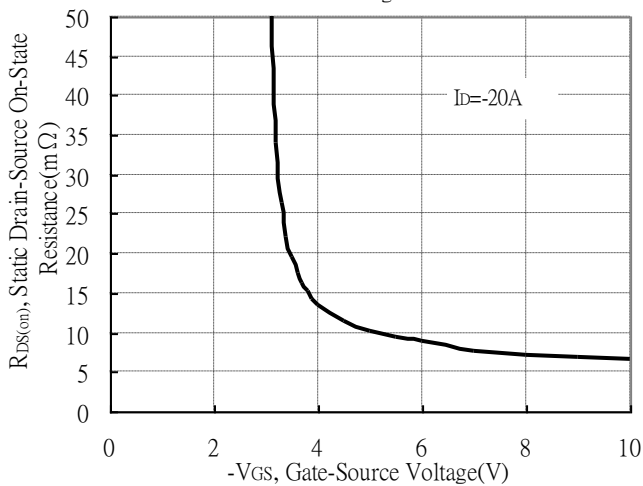
Static Drain-Source On-State resistance vs Drain Current



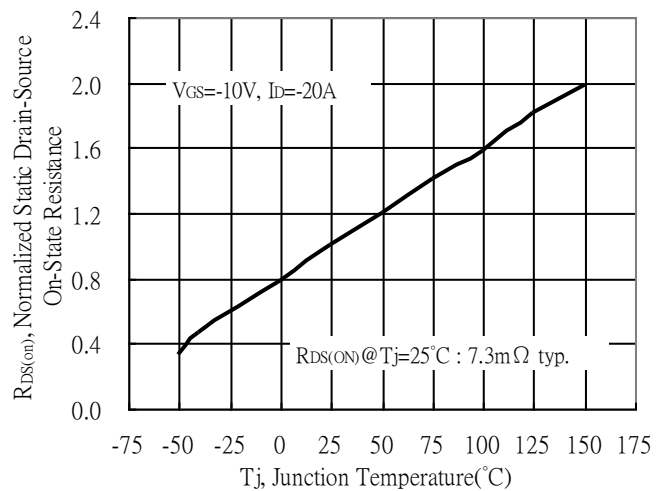
Source Drain Current vs Source-Drain Voltage



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

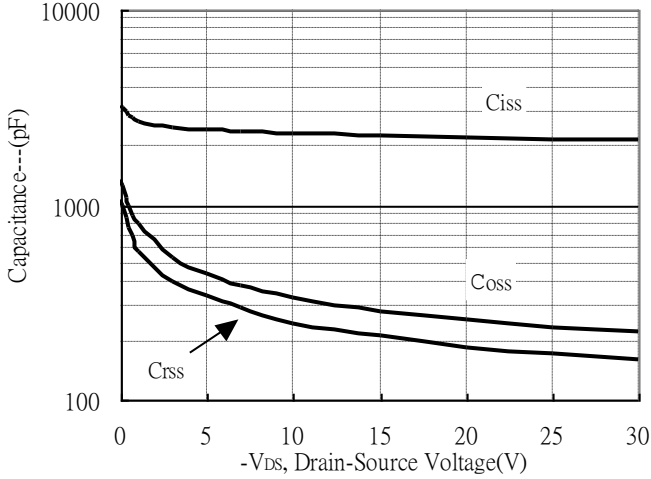


Drain-Source On-State Resistance vs Junction Temperature

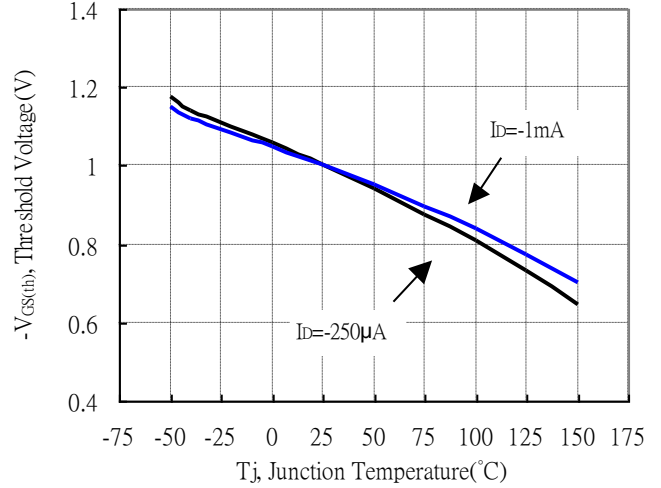


## Typical Characteristics(Cont.)

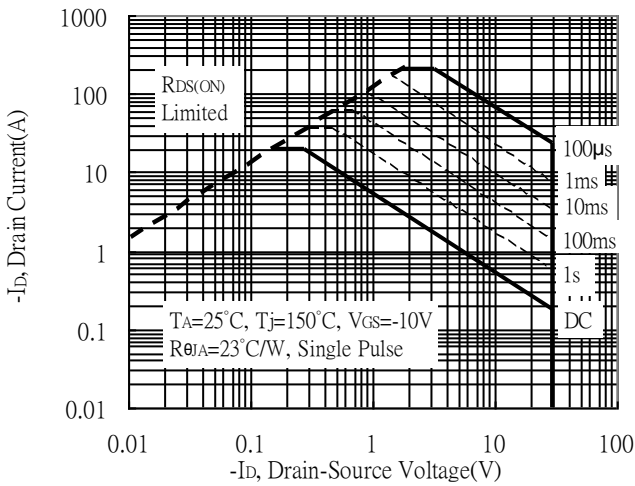
Capacitance vs Drain-to-Source Voltage



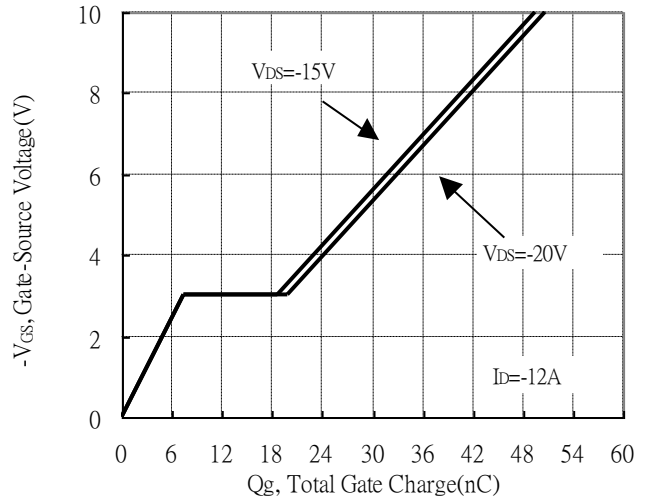
Threshold Voltage vs Junction Temperature



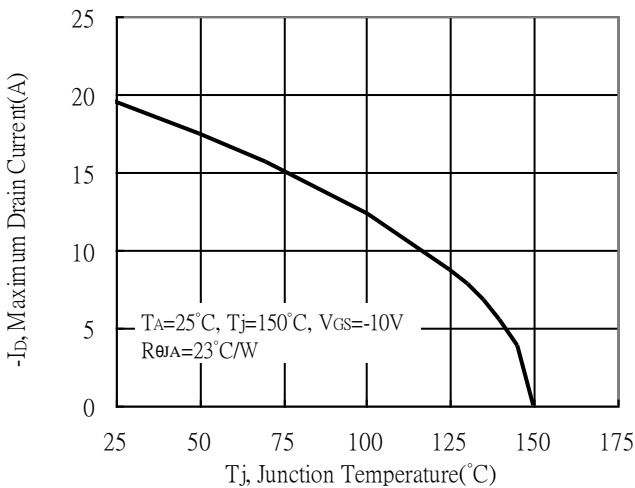
Maximum Safe Operating Area



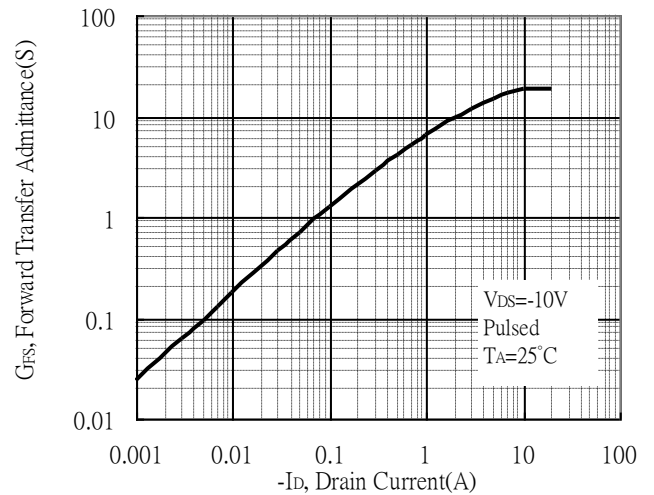
Gate Charge Characteristics



Maximum Drain Current vs Junction Temperature



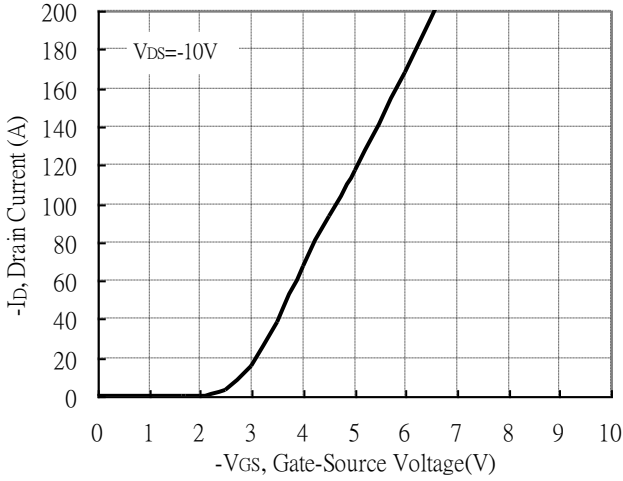
Forward Transfer Admittance vs Drain Current



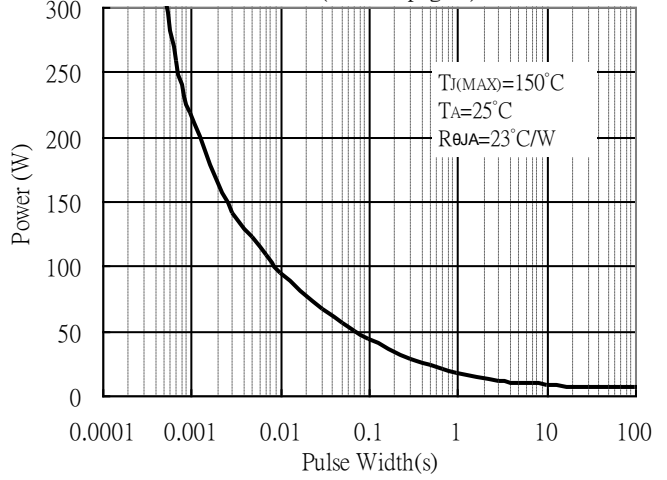


### Typical Characteristics(Cont.)

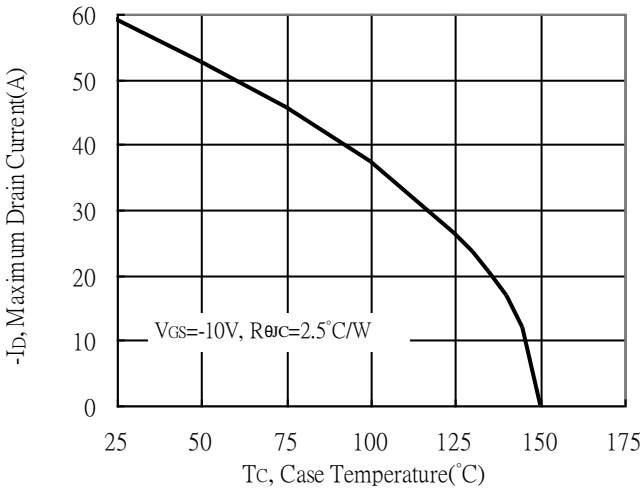
Typical Transfer Characteristics



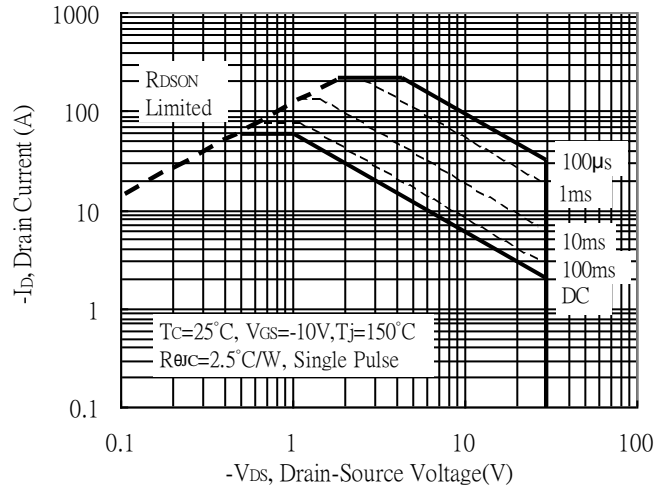
Single Pulse Power Rating, Junction to Ambient  
(Note on page 2)



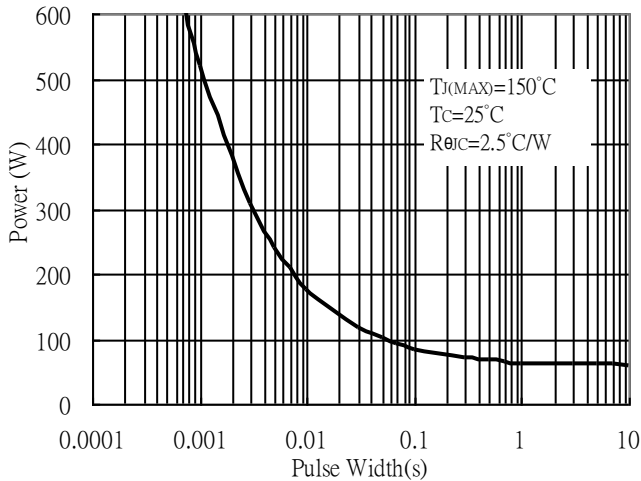
Maximum Drain Current vs Case Temperature



Maximum Safe Operating Area

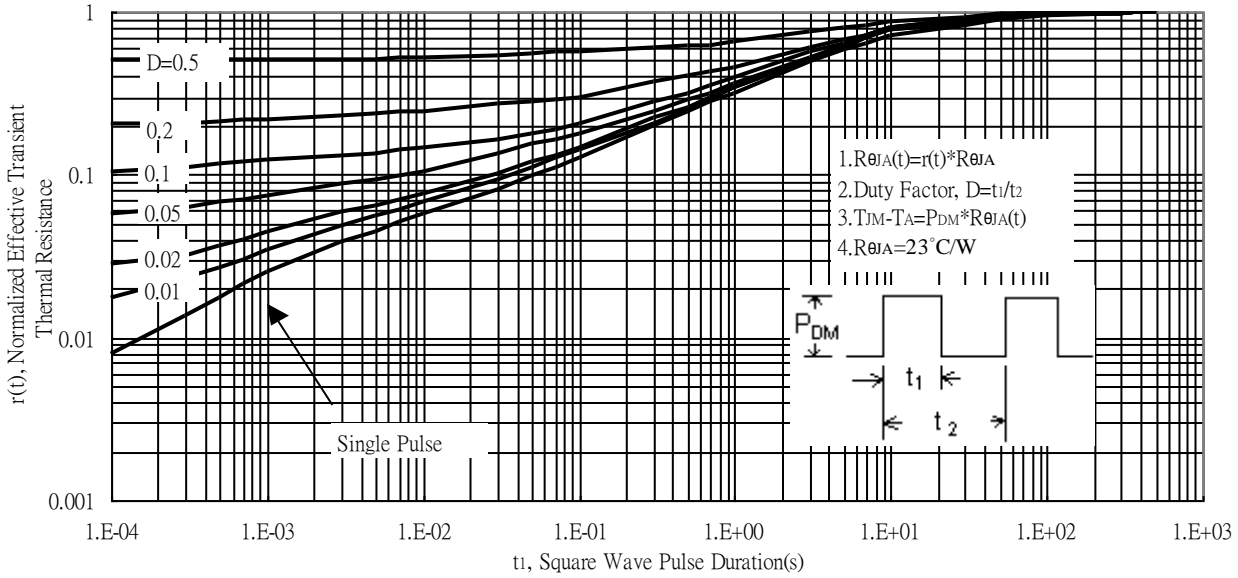


Single Pulse Maximum Power Dissipation

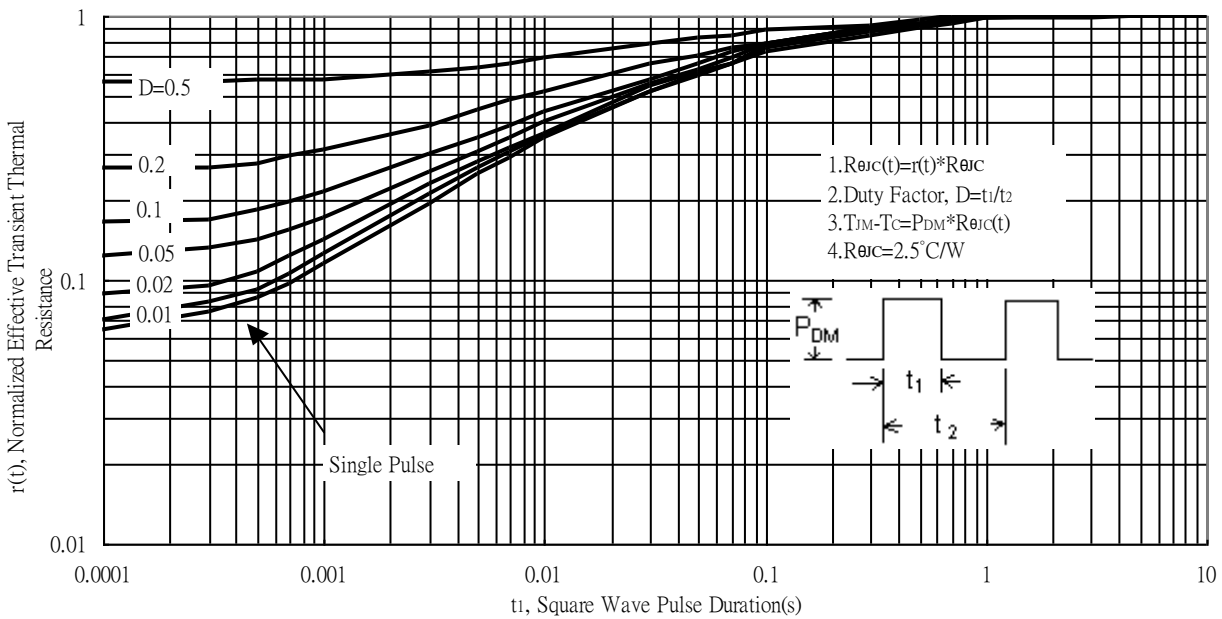


**Typical Characteristics(Cont.)**

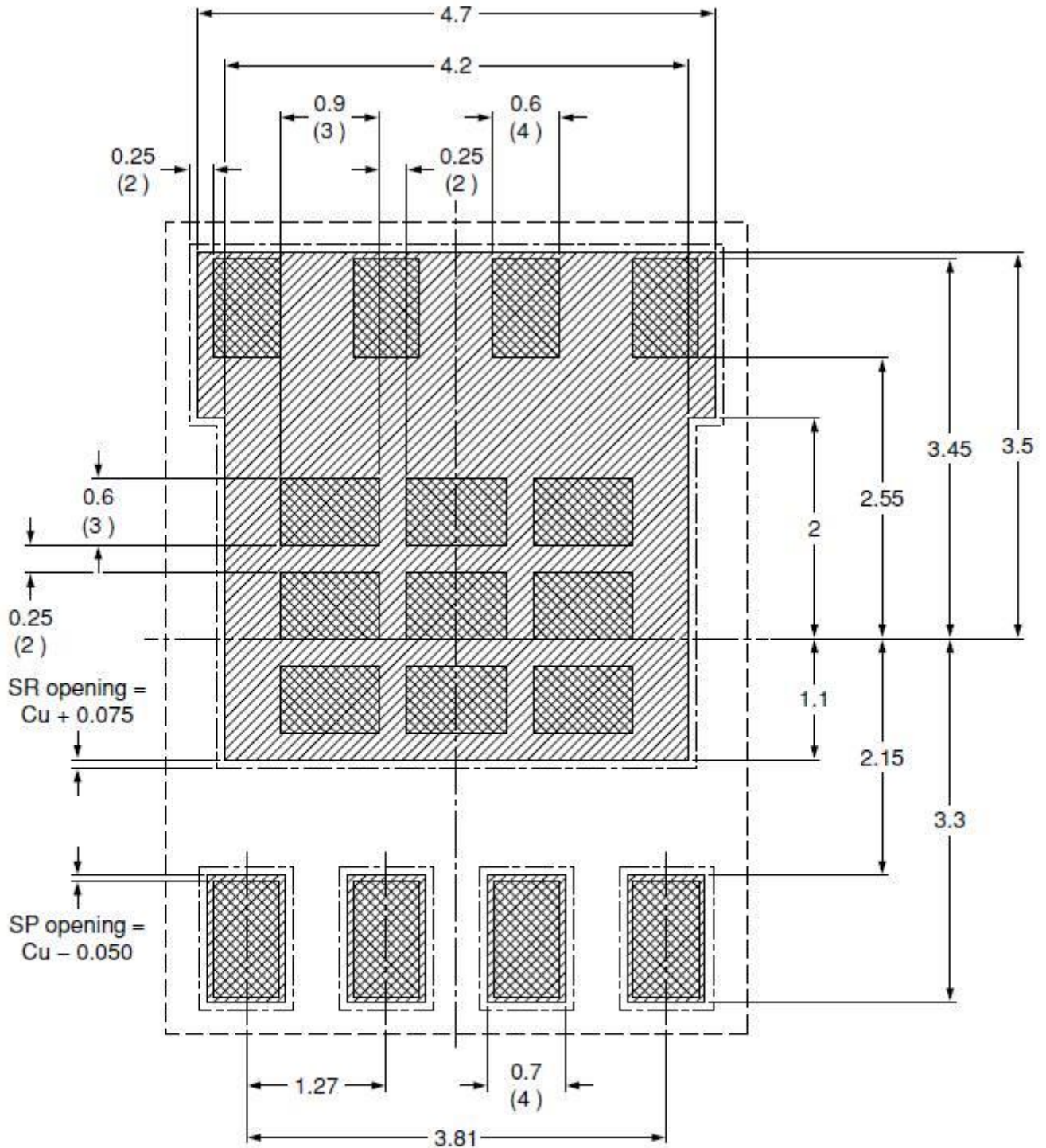
Transient Thermal Response Curves



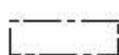
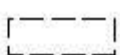


Transient Thermal Response Curves



**Recommended Soldering Footprint & Stencil Design**

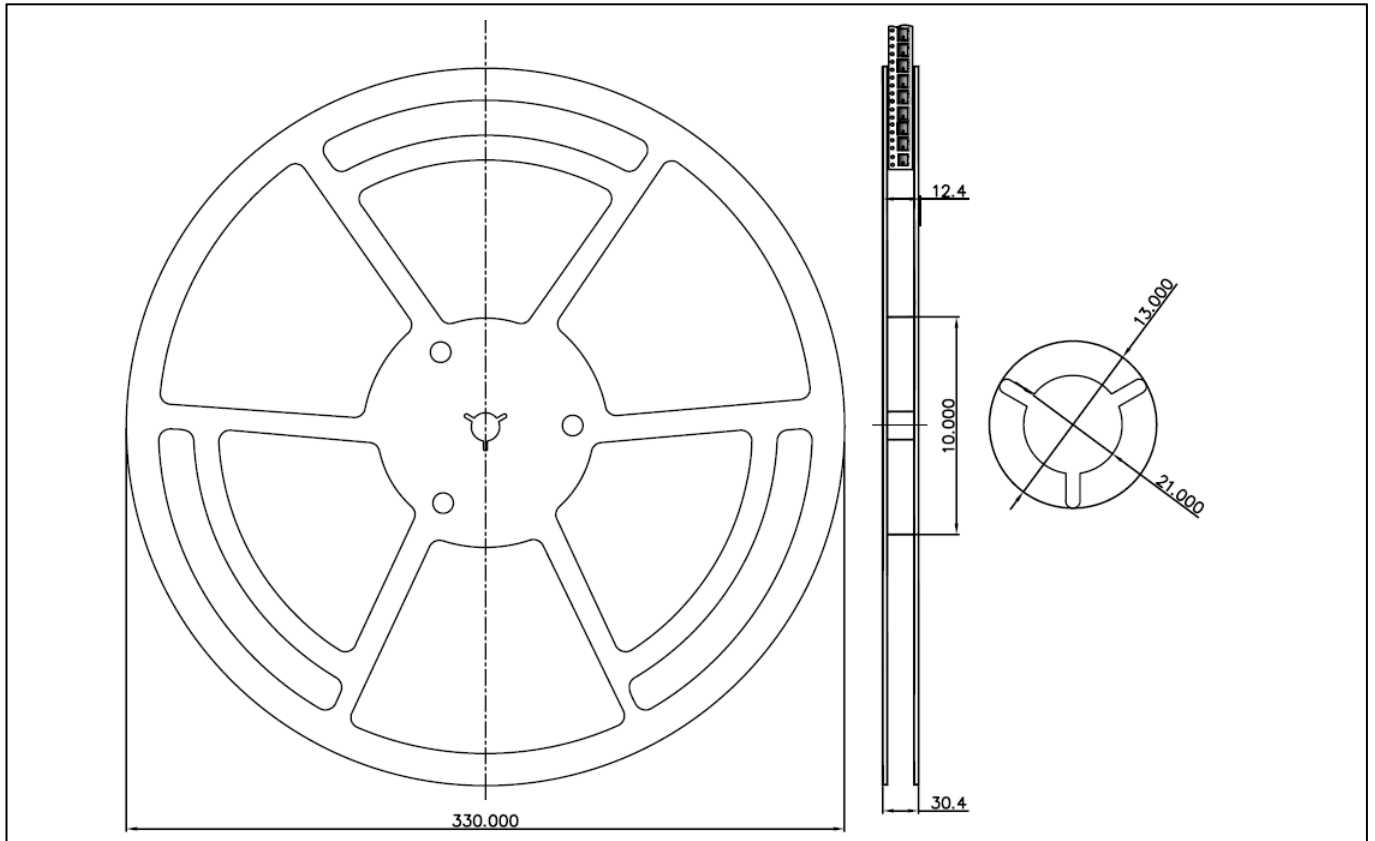


- |   |   |
|---|---|
|  solder lands  |  solder paste<br>125 $\mu$ m stencil |
|  solder resist |  occupied area                       |

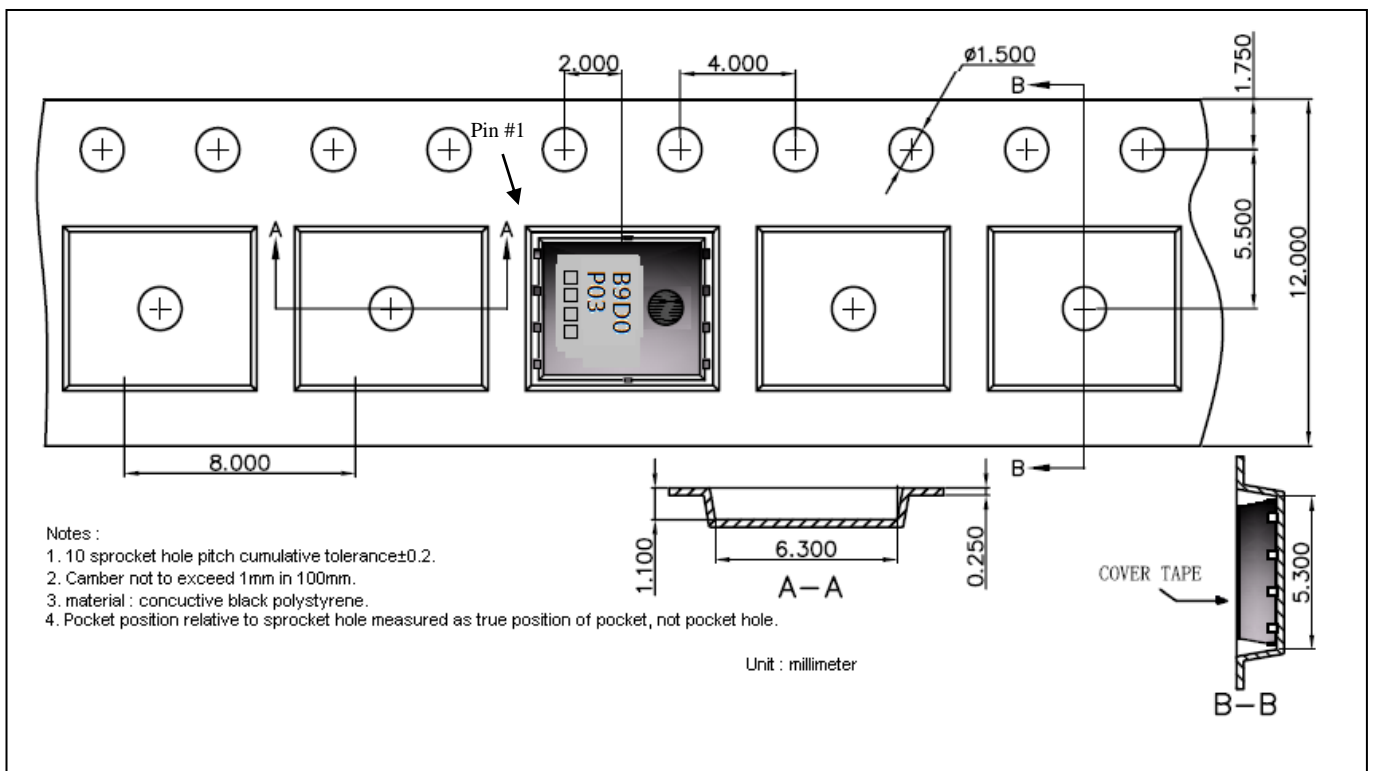
unit : mm



**Reel Dimension**

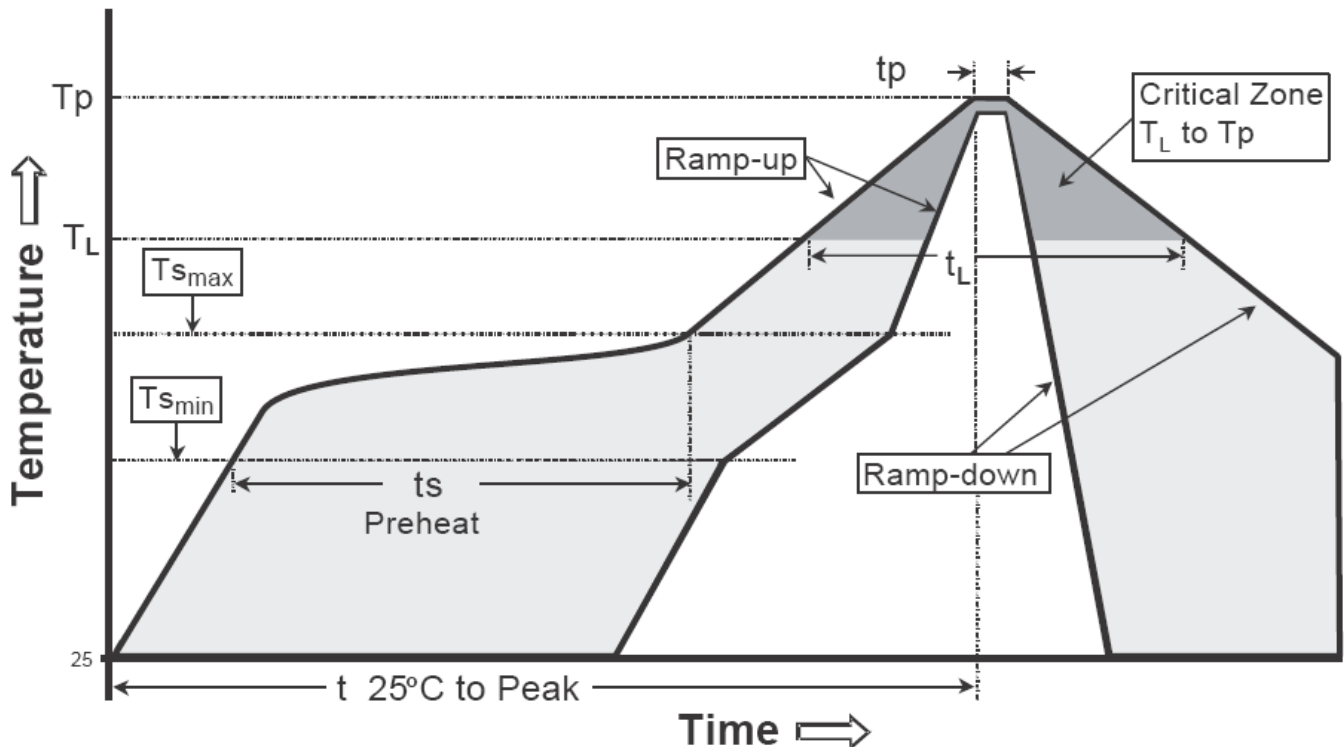


**Carrier Tape Dimension**



**Recommended wave soldering condition**

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

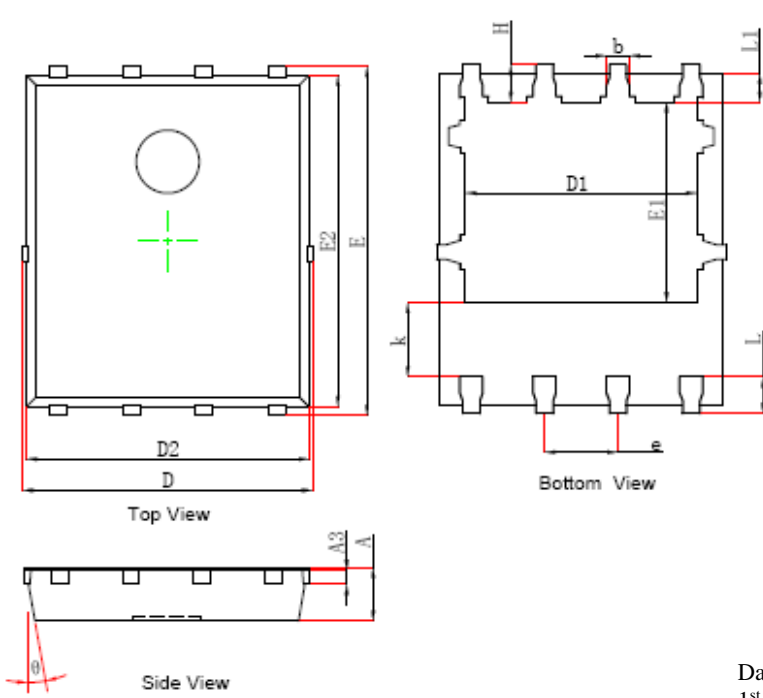
**Recommended temperature profile for IR reflow**


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (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(t <sub>p</sub> )	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.

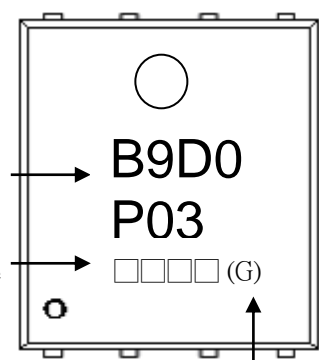
Note :1. All temperatures refer to topside of the package, measured on the package body surface.

2.For devices mounted on FR-4 PCB of 1.6mm or equivalent grade PCB. If other grade PCB is used, care should be taken to match the coefficients of thermal expansion between components and PCB. If they are not matched well, the solder joints may crack or the bodies of the parts may crack or shatter as the assembly cools.

**DFN5x6 Dimension**



**Marking :**



Device Name → **B9D0**  
**P03**

Date Code → □□□□ (G)

Assembly  
 Site code : Blank → JCET  
 G → GEM

8-Lead DFN5x6 Plastic Package  
 CYS Package Code : H8

Date Code(counting from left to right) :  
 1<sup>st</sup> code: year code, the last digit of Christian year  
 2<sup>nd</sup> 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  
 3<sup>rd</sup> and 4<sup>th</sup> codes : production serial number, 01~99

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043	k	1.100	-	0.043	-
A3	0.200	0.300	0.008	0.012	b	0.330	0.510	0.013	0.020
D	4.944	5.096	0.195	0.201	e	1.270	TYP.	0.050	TYP.
E	5.900	6.126	0.232	0.241	L	0.510	0.711	0.020	0.028
D1	3.670	4.110	0.144	0.162	L1	0.310	0.576	0.012	0.023
E1	3.375	3.780	0.133	0.149	H	0.410	0.726	0.016	0.029
D2	4.800	5.000	0.189	0.197	θ	8°	12°	8°	12°
E2	5.674	5.826	0.223	0.229					

**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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