

**P-Channel Enhancement Mode Power MOSFET**

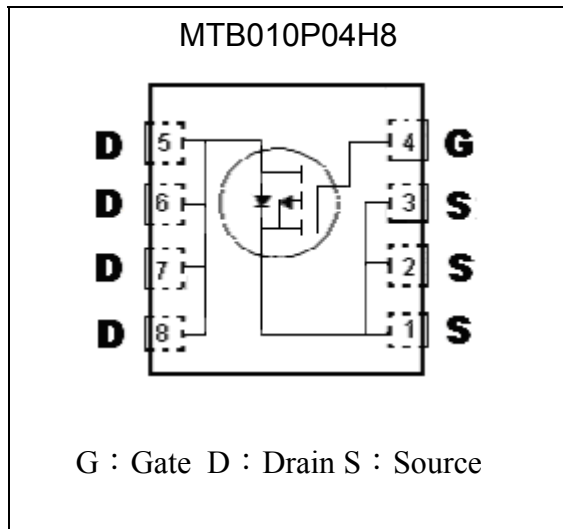
# MTB010P04H8

BV <sub>DSS</sub>		-40V
I <sub>D</sub> @V <sub>GS</sub> =-12V, T <sub>C</sub> =25°C		-49A
I <sub>D</sub> @V <sub>GS</sub> =-12V, T <sub>A</sub> =25°C		-11A
R <sub>DSON(TYP)</sub>	V <sub>GS</sub> =-12V, I <sub>D</sub> =-15A	8.3mΩ
	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	12.6mΩ

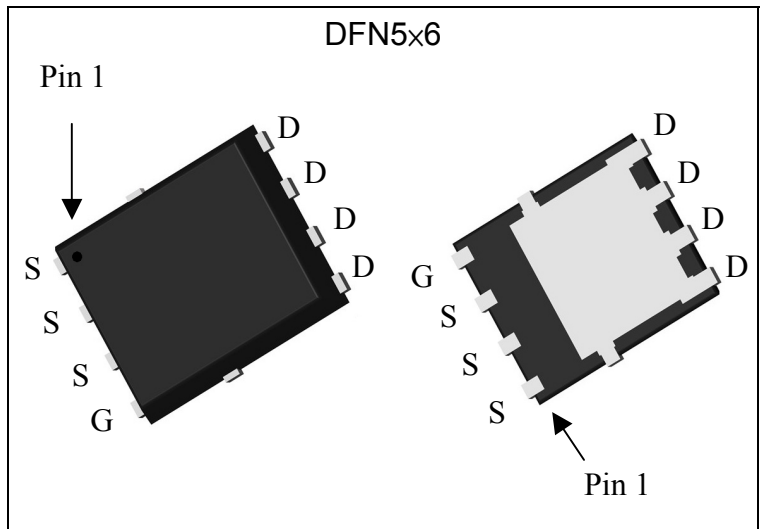
**Features**

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

**Symbol**

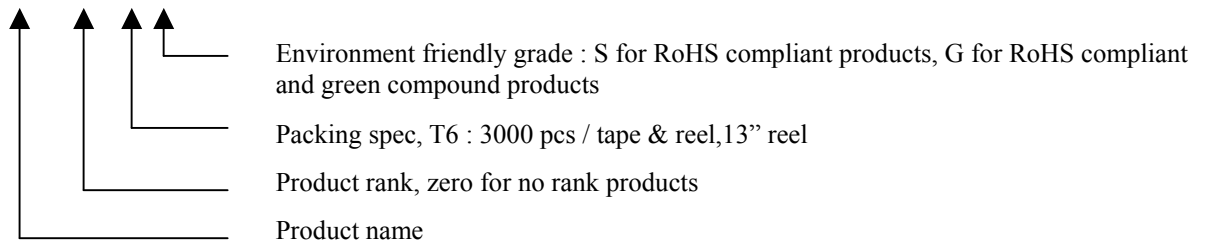


**Outline**



**Ordering Information**

Device	Package	Shipping
MTB010P04H8-0-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>	-40		V	
Gate-Source Voltage	V <sub>GS</sub>	±20			
Continuous Drain Current @ T <sub>C</sub> =25°C, V <sub>GS</sub> =-12V (Note1)	I <sub>D</sub>	-49		A	
Continuous Drain Current @ T <sub>C</sub> =100°C, V <sub>GS</sub> =-12V (Note1)		-31			
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =-12V (Note2)	I <sub>DSM</sub>	-15.5	-11		
Continuous Drain Current @ T <sub>A</sub> =70°C, V <sub>GS</sub> =-12V (Note2)		-12.4	-8.8		
Pulsed Drain Current (Note3)	I <sub>DM</sub>	-160			
Avalanche Current @ L=0.1mH	I <sub>AS</sub>	-56			
Avalanche Energy @ L=1mH, I <sub>D</sub> =-26A, V <sub>DD</sub> =-10V (Note4)	E <sub>AS</sub>	338		mJ	
Total Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C (Note1)	50		W
		T <sub>C</sub> =100°C (Note1)	20		
	P <sub>DSM</sub>	T <sub>A</sub> =25°C (Note2)	5.0	2.5	
		T <sub>A</sub> =70°C (Note2)	3.2	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	2.5	°C/W
Thermal Resistance, Junction-to-ambient (Note2)	R <sub>th,j-a</sub>	t≤10s	18	
		Steady State	45	

- 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>DSM</sub> 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. Ratings are based on low frequency and low duty cycles to keep initial T<sub>J</sub>=25°C.
4. 100% tested by conditions of L=100μH, I<sub>AS</sub>=-10A, V<sub>GS</sub>=-10V, V<sub>DD</sub>=-15V

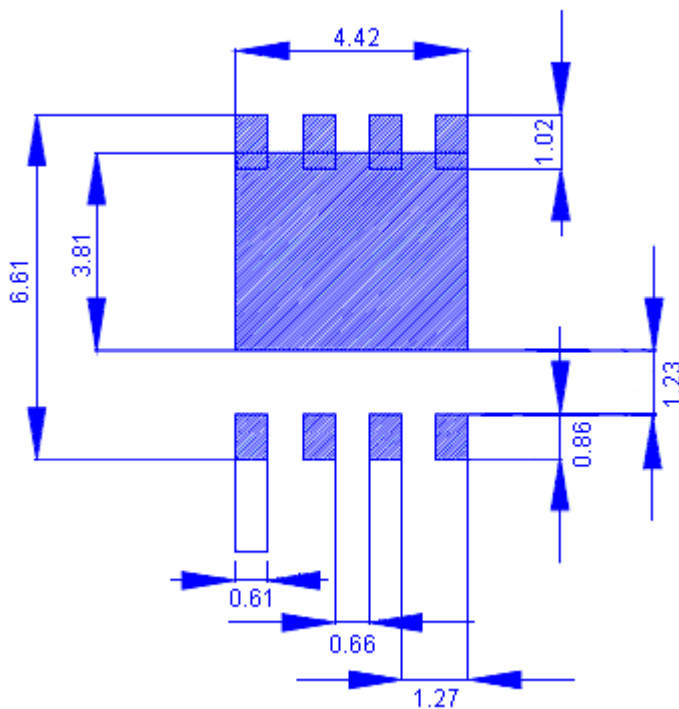
**Characteristics (Tc=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	-40	-	-	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	-	24	-	S	V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A
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
	-	-	-25		V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V, T <sub>J</sub> =85°C
R <sub>DS(ON)</sub> *1	-	8.3	12.5	mΩ	V <sub>GS</sub> =-12V, I <sub>D</sub> =-15A
	-	12.6	18.0		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A

<b>Dynamic *4</b>					
Ciss	-	3254	-	pF	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, f=1MHz
Coss	-	269	-		
Crss	-	198	-		
Qg *1, 2	-	66	99	nC	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A
Qgs *1, 2	-	10	-		
Qgd *1, 2	-	14	-		
t <sub>d(ON)</sub> *1, 2	-	17.6	26.4	ns	V <sub>DS</sub> =-20V, I <sub>D</sub> =-15A, V <sub>GS</sub> =-10V, R <sub>G</sub> =1Ω
t <sub>r</sub> *1, 2	-	20.2	30.3		
t <sub>d(OFF)</sub> *1, 2	-	88.4	132.6		
t <sub>f</sub> *1, 2	-	18.8	28.2		
Rg	-	4.7	-	Ω	f=1MHz
<b>Source-Drain Diode</b>					
V <sub>SD</sub> *1	-	-0.82	-1.2	V	I <sub>S</sub> =-10A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	16.6	-	ns	I <sub>F</sub> =-10A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	11.7	-	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.

## Recommended Soldering Footprint

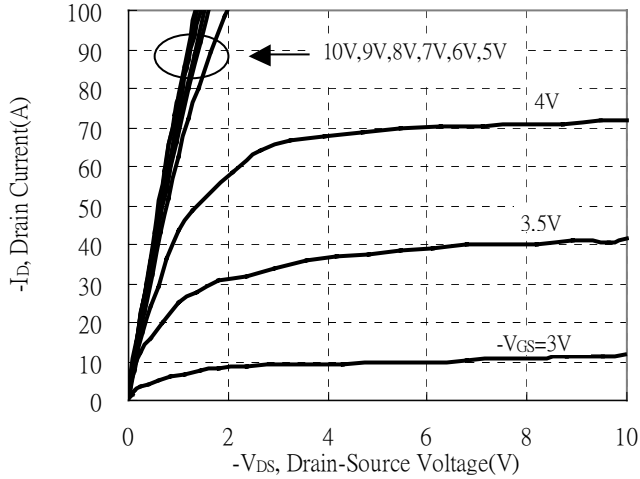


unit : mm

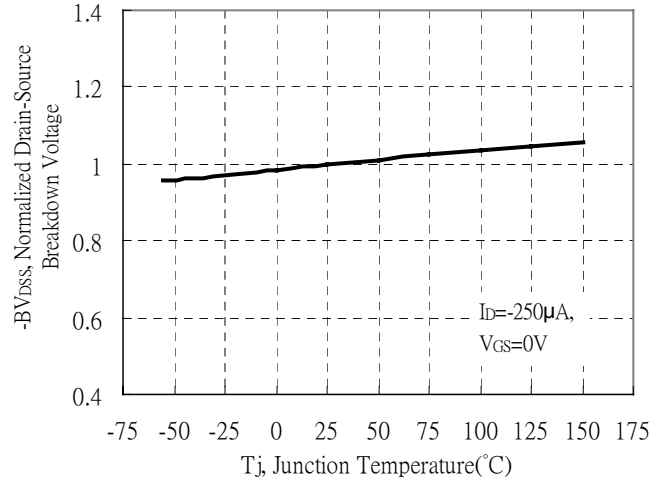


**Typical Characteristics**

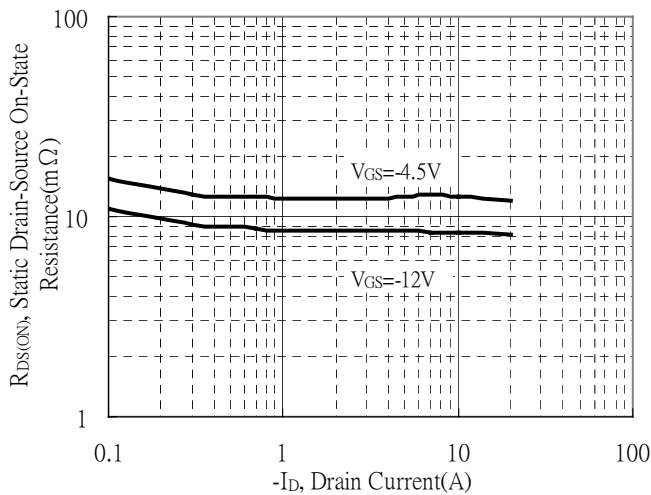
Typical Output Characteristics



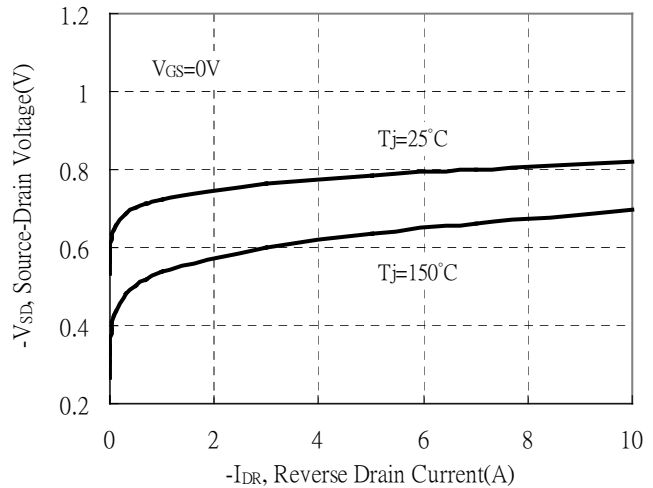
Brekdown Voltage vs Ambient Temperature



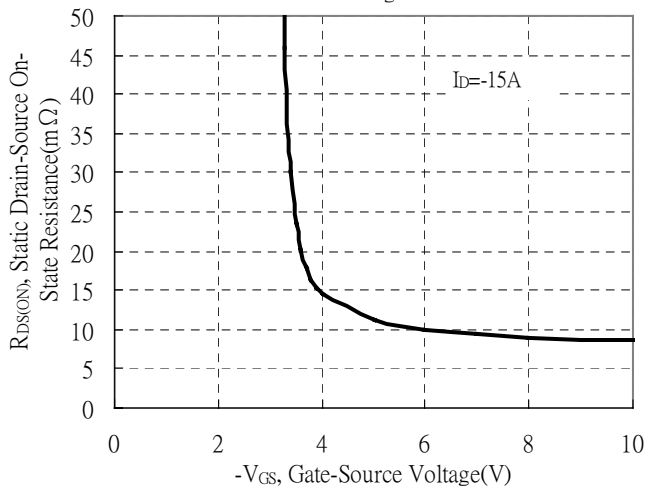
Static Drain-Source On-State resistance vs Drain Current



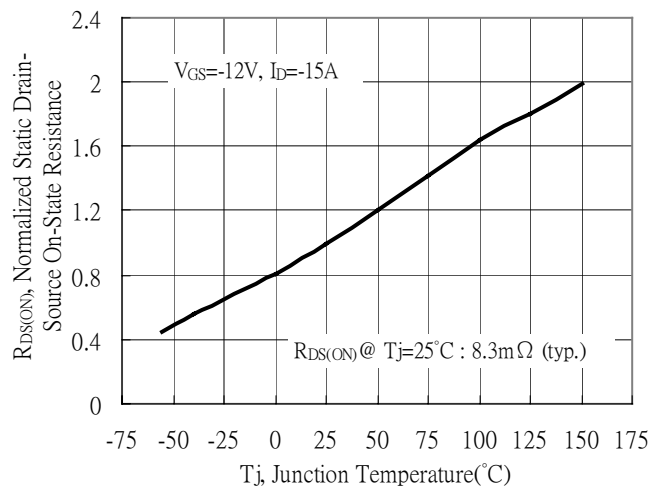
Reverse Drain Current vs Source-Drain Voltage



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



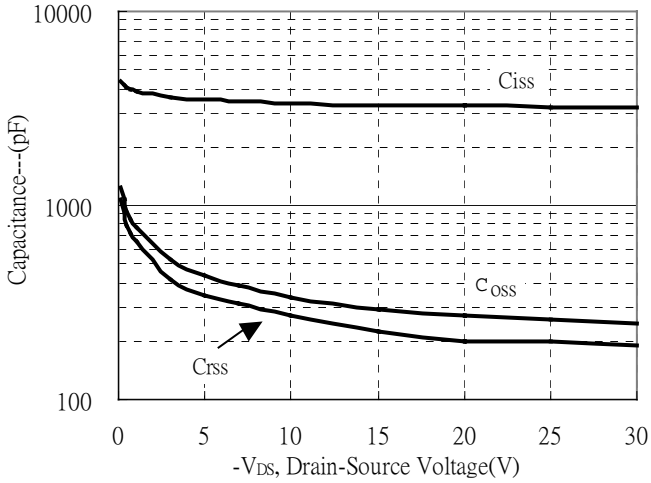
Drain-Source On-State Resistance vs Junction Temperature



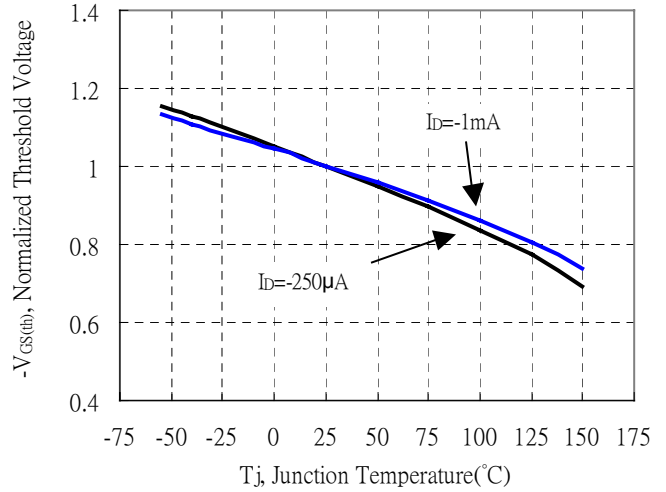


### Typical Characteristics(Cont.)

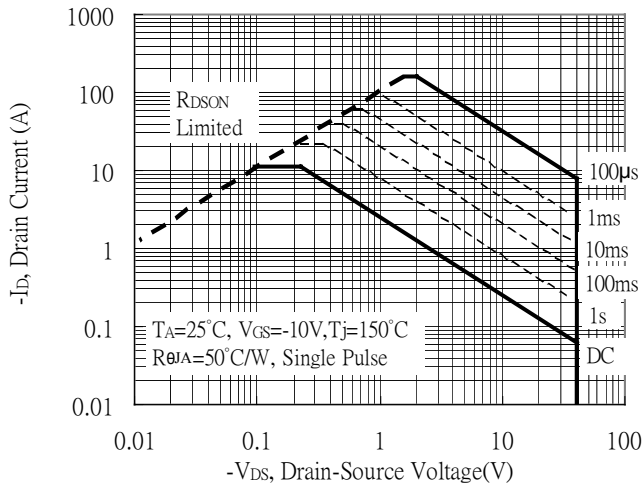
Capacitance vs Drain-to-Source Voltage



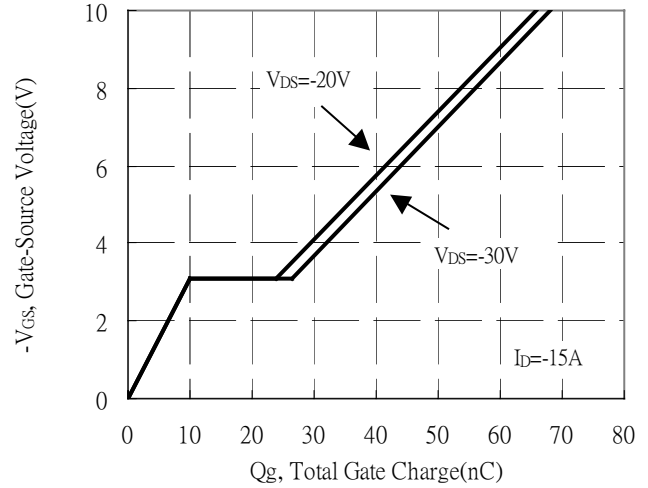
Threshold Voltage vs Junction Temperature



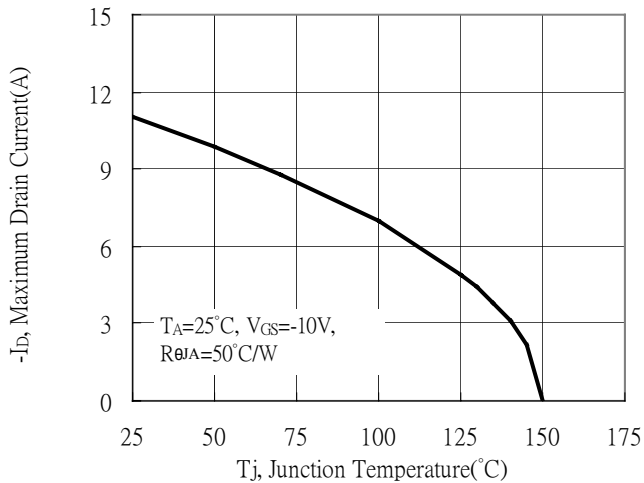
Maximum Safe Operating Area



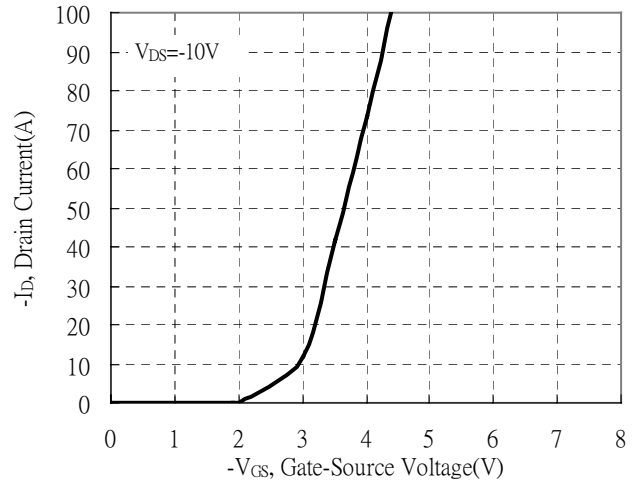
Gate Charge Characteristics



Maximum Drain Current vs Junction Temperature



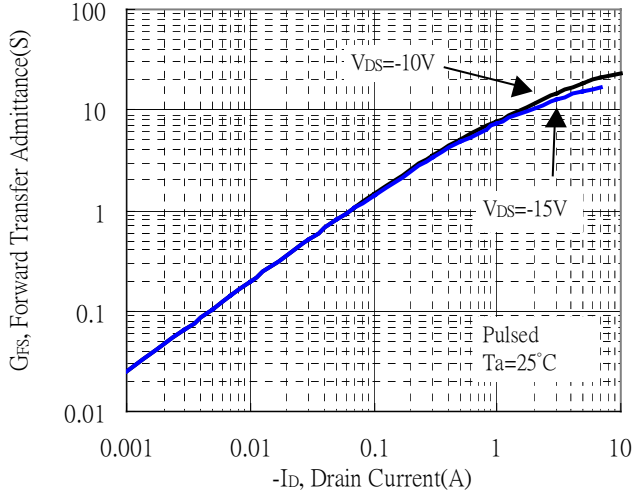
Typical Transfer Characteristics



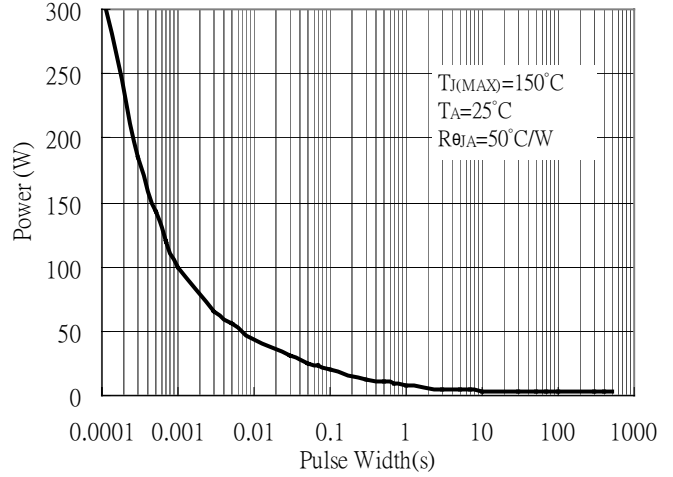


**Typical Characteristics(Cont.)**

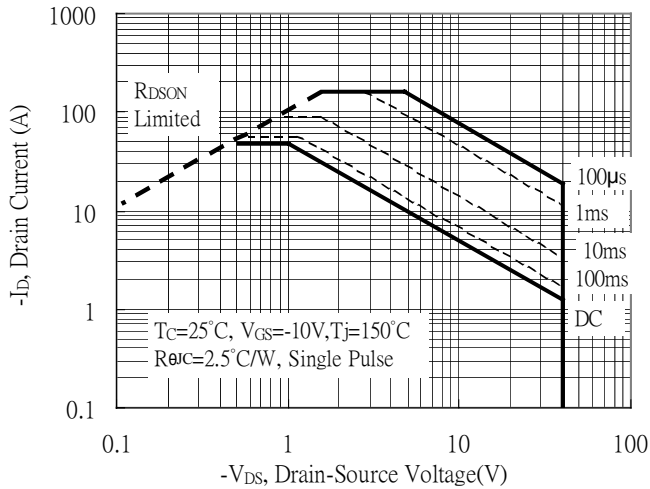
Forward Transfer Admittance vs Drain Current



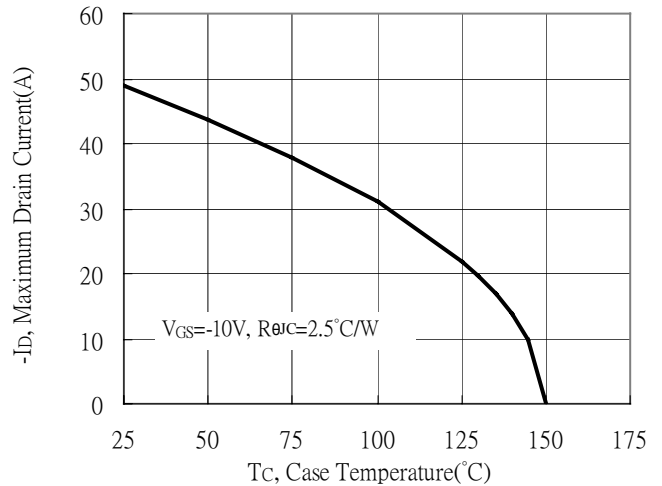
Single Pulse Maximum Power Dissipation



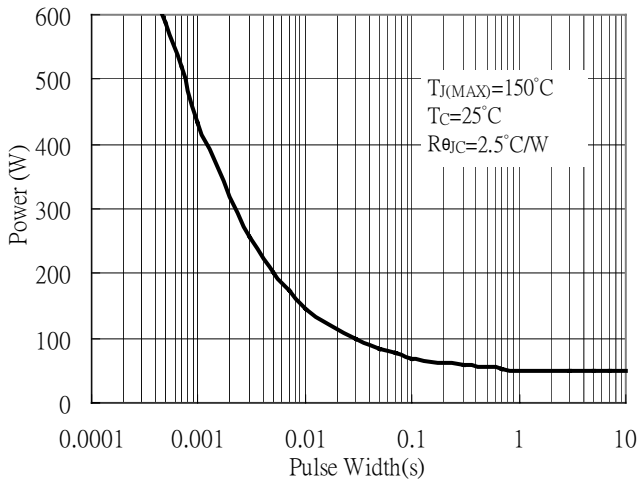
Maximum Safe Operating Area



Maximum Drain Current vs Case Temperature



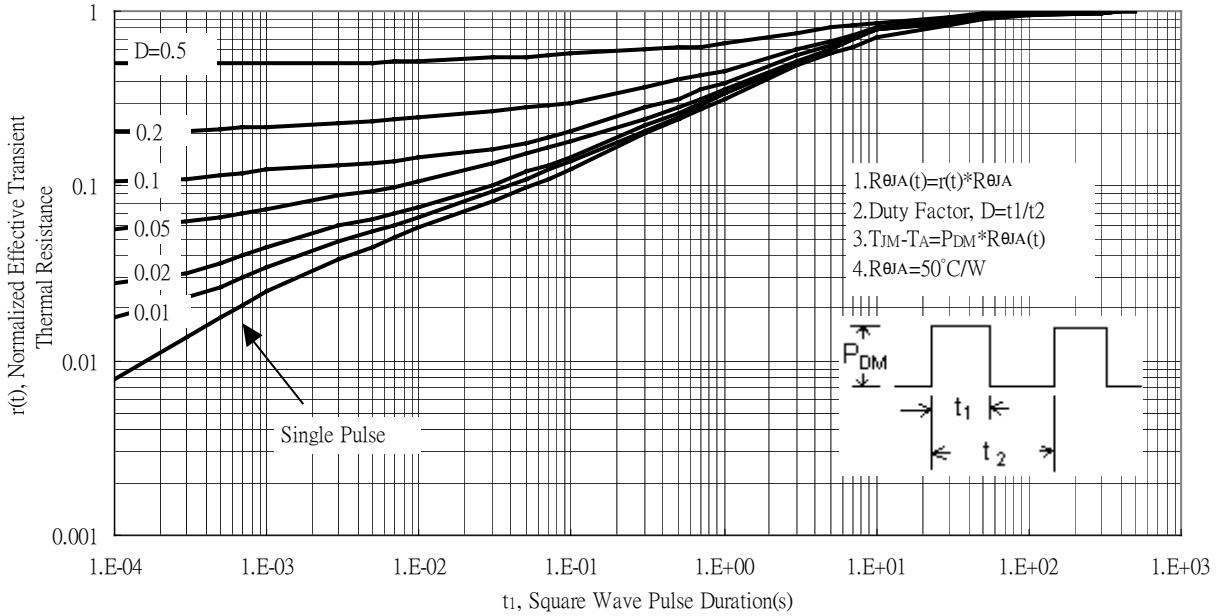
Single Pulse Maximum Power Dissipation



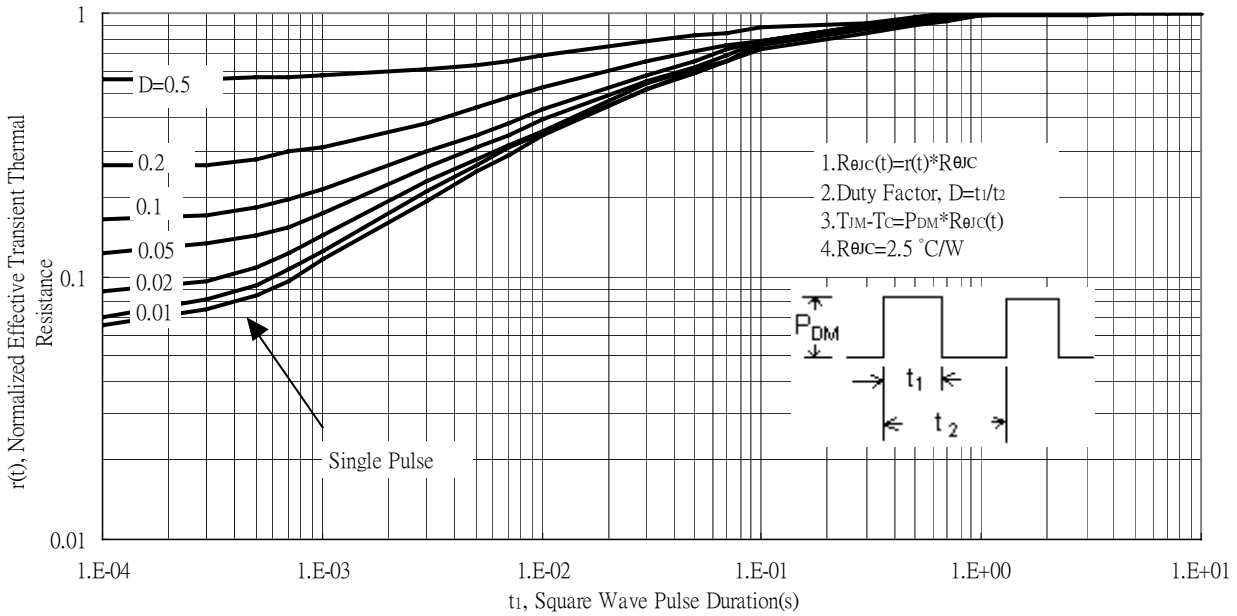


Typical Characteristics(Cont.)

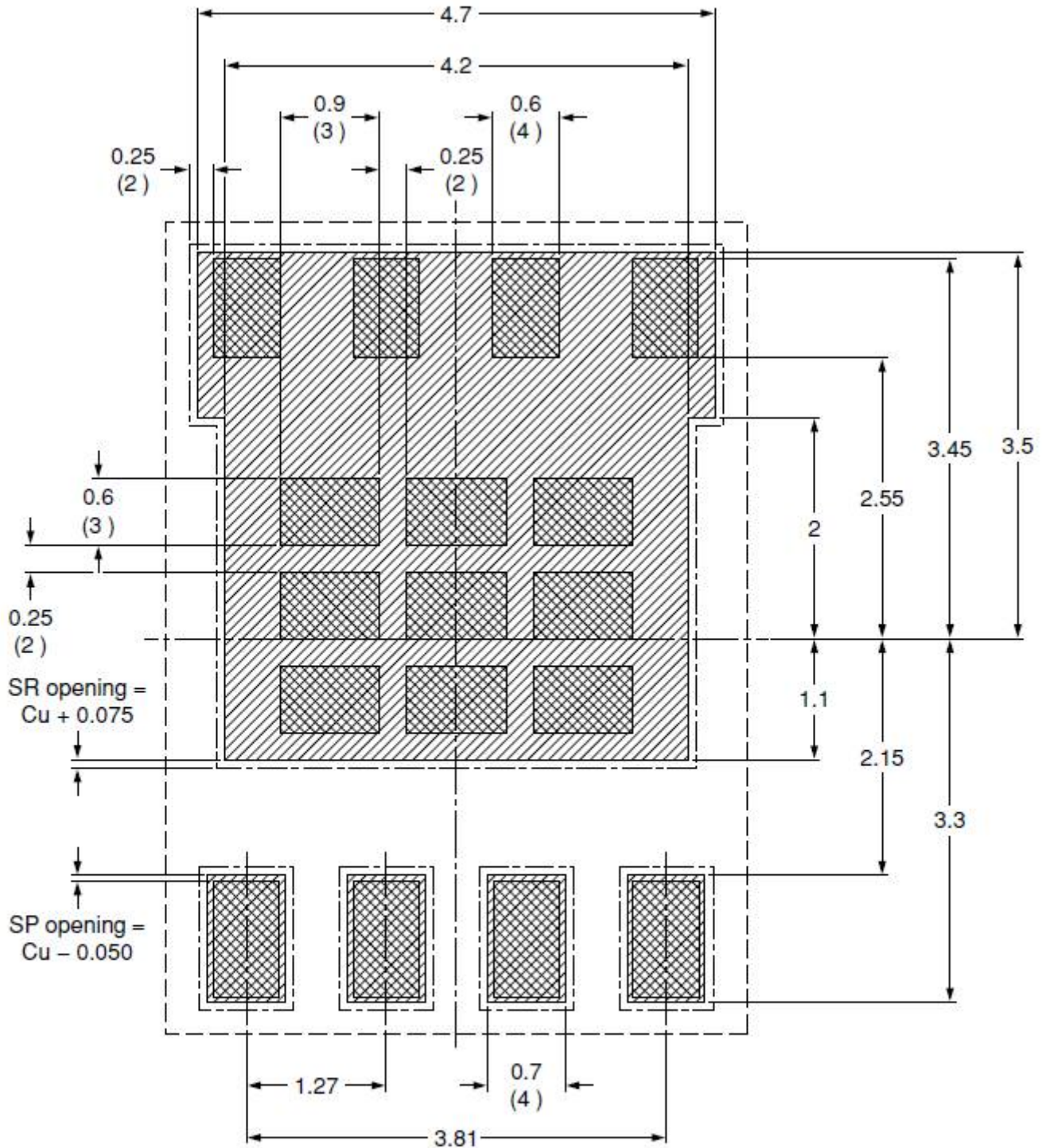
Transient Thermal Response Curves



Transient Thermal Response Curves



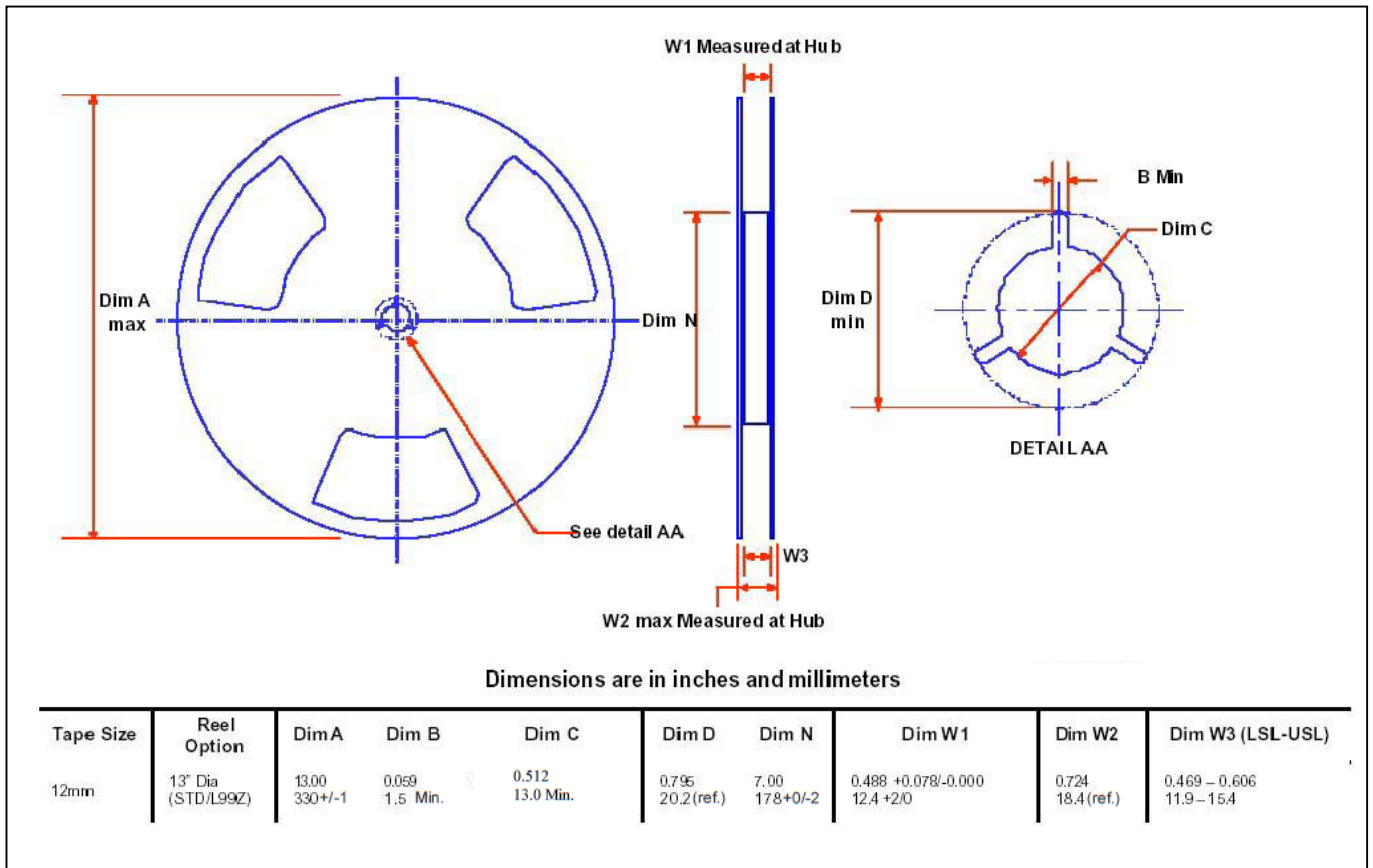
**Recommended Soldering Footprint & Stencil Design**



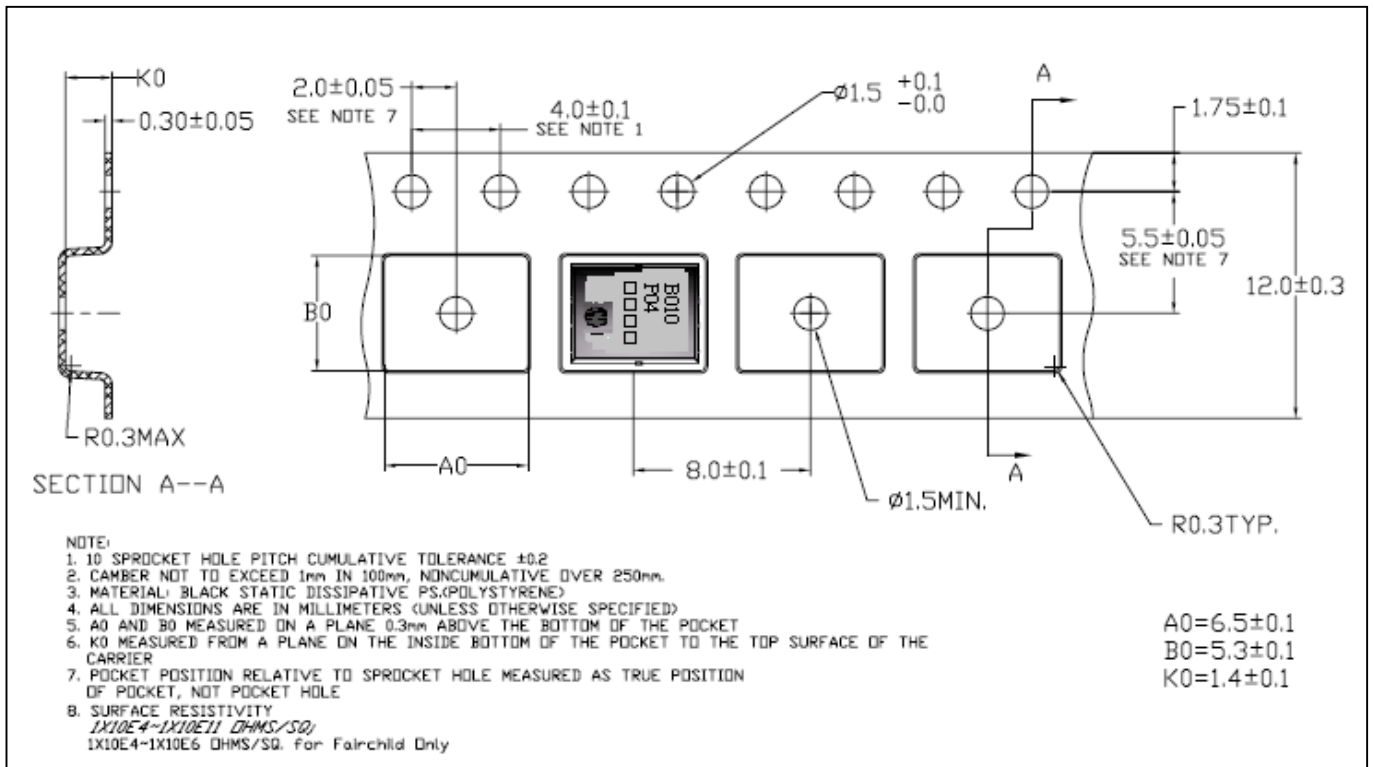
unit : mm



**Reel Dimension**



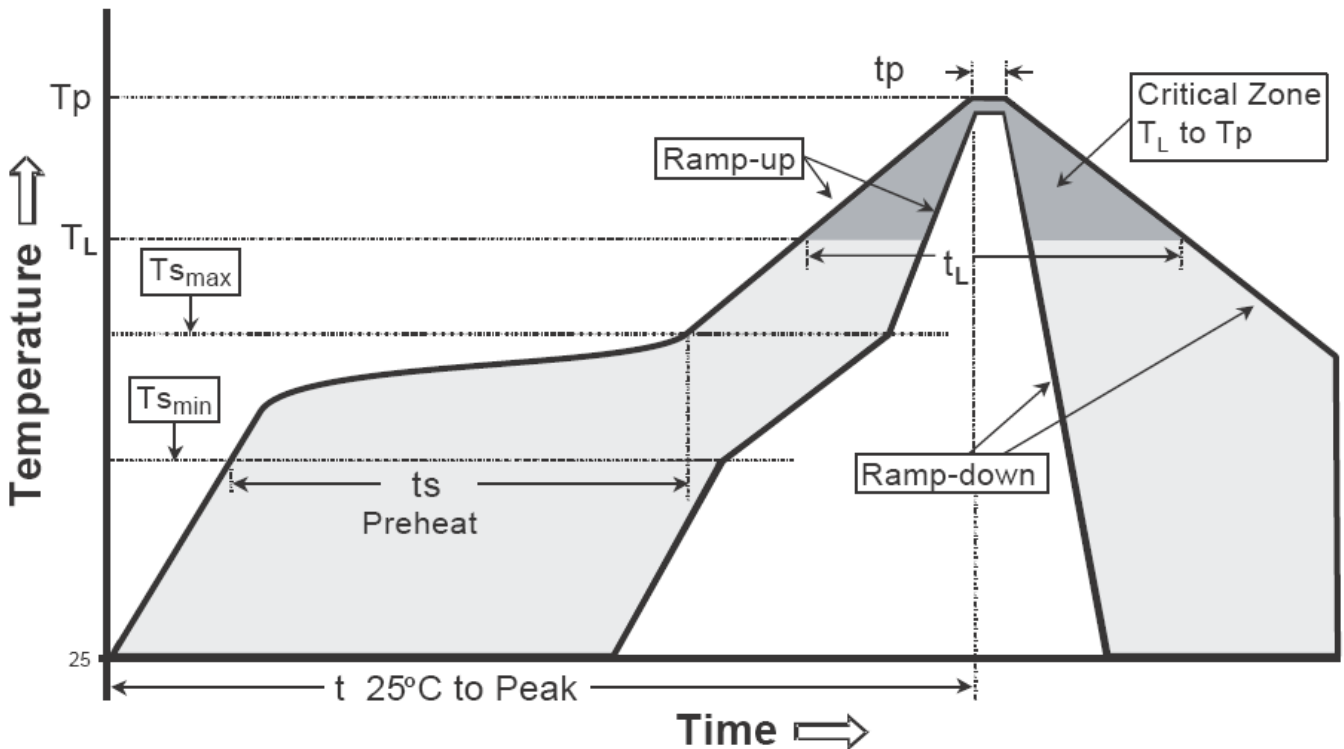
**Carrier Tape Dimension**



**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**

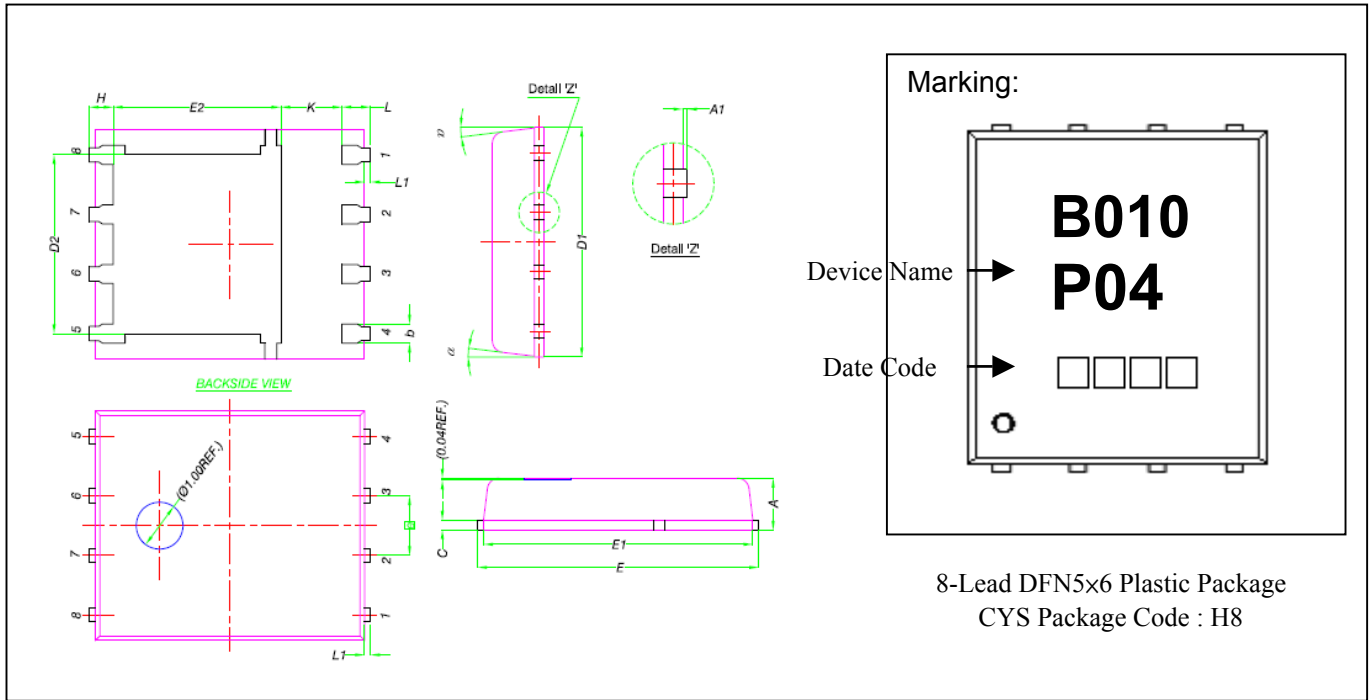


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (TL)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



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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