

# N-Channel Enhancement Mode Power MOSFET

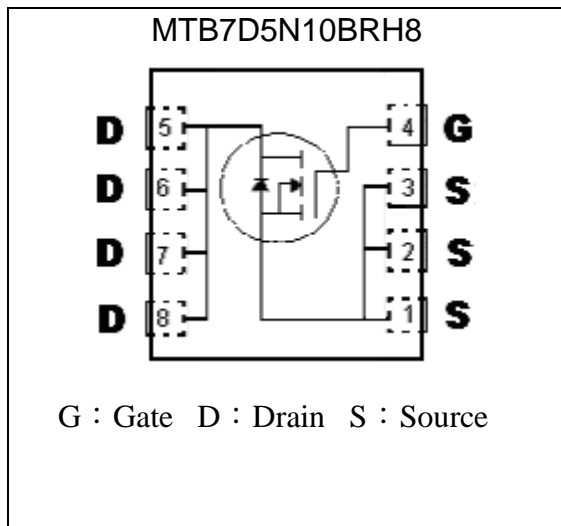
## MTB7D5N10BRH8

### Features

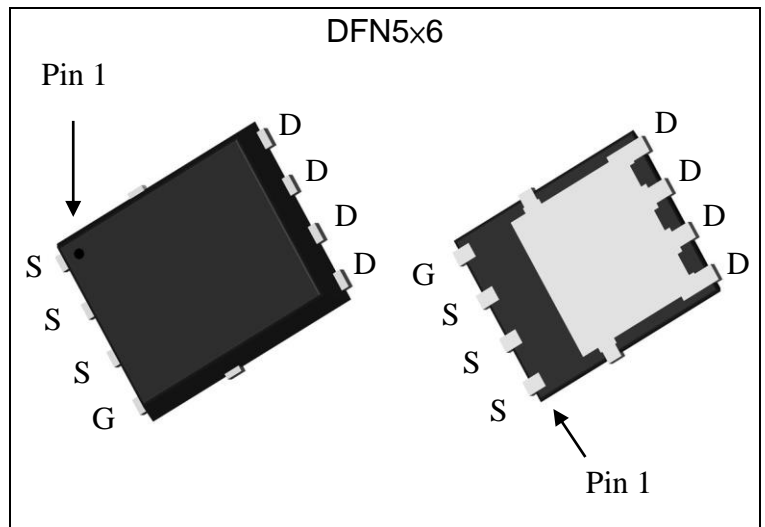
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

<b>BV<sub>DSS</sub></b>	<b>100V</b>
<b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>C</sub>=25°C</b>	<b>46A</b>
<b>I<sub>D</sub>@V<sub>GS</sub>=10V, T<sub>A</sub>=25°C</b>	<b>12A</b>
<b>R<sub>DS(ON)</sub>@V<sub>GS</sub>=10V, I<sub>D</sub>=11.5A</b>	<b>6.1 mΩ (typ)</b>
<b>R<sub>DS(ON)</sub>@V<sub>GS</sub>=4.5V, I<sub>D</sub>=9.5A</b>	<b>11.5 mΩ (typ)</b>

### Symbol

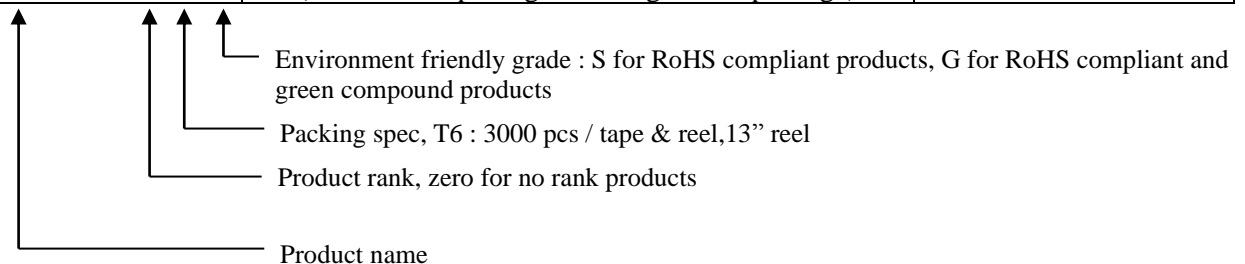


### Outline



### Ordering Information

Device	Package	Shipping
MTB7D5N10BRH8-0-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>	100	V	
Gate-Source Voltage	V <sub>GS</sub>	±20		
Continuous Drain Current @ T <sub>C</sub> =25°C, V <sub>GS</sub> =10V	I <sub>D</sub>	46	A	
Continuous Drain Current @ T <sub>C</sub> =70°C, V <sub>GS</sub> =10V		36.8		
Continuous Drain Current @ T <sub>A</sub> =25°C, V <sub>GS</sub> =10V		12		
Continuous Drain Current @ T <sub>A</sub> =70°C, V <sub>GS</sub> =10V		9.6		
Pulsed Drain Current	I <sub>DM</sub>	184 *1		
Avalanche Current @ L=0.1mH	I <sub>AS</sub>	28		
Avalanche Energy @ L=0.5mH, I <sub>D</sub> =20A, V <sub>DD</sub> =50V	E <sub>AS</sub>	100 *4	mJ	
Total Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	40	W
		T <sub>C</sub> =100°C	16	
		T <sub>A</sub> =25°C	2.7 *3	
		T <sub>A</sub> =70°C	1.7 *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>	3.09	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>θJA</sub>	45.5 *3	

- Note : 1. Pulse width limited by maximum junction temperature  
 2. Duty cycle ≤ 1%  
 3. Surface mounted on 1 in<sup>2</sup> copper pad of FR-4 board, t ≤ 10s ; 125°C/W when mounted on minimum copper pad.  
 4. 100% tested by conditions of L=0.5mH, I<sub>AS</sub>=10A, V<sub>GS</sub>=10V, V<sub>DD</sub>=50V

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	100	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.06	-	V/°C	Reference to 25°C, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1	-	2.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
*G <sub>FS</sub>	-	37.6	-	S	V <sub>DS</sub> =5V, 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> =80V, V <sub>GS</sub> =0V
	-	-	25		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C

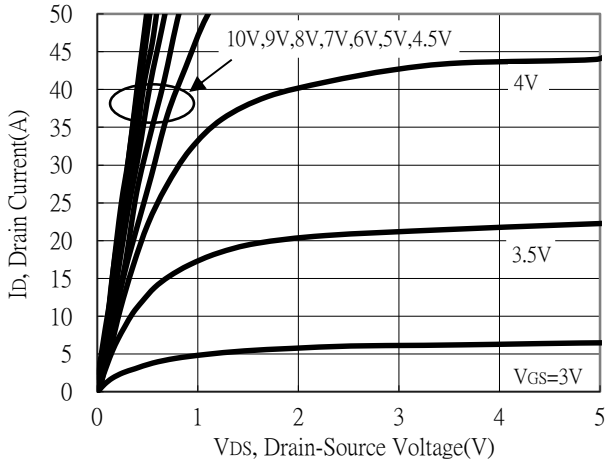


*R <sub>DS(ON)</sub>	-	6.1	8	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =11.5A
	-	11.5	17		V <sub>GS</sub> =4.5V, I <sub>D</sub> =9.5A
<b>Dynamic</b>					
*Q <sub>g</sub>	-	45.1	-	nC	V <sub>DS</sub> =50V, I <sub>D</sub> =11.5A, V <sub>GS</sub> =10V
*Q <sub>gs</sub>	-	9	-		
*Q <sub>gd</sub>	-	10	-		
*t <sub>d(ON)</sub>	-	20.6	-	ns	V <sub>DS</sub> =50V, I <sub>D</sub> =11.5A, V <sub>GS</sub> =10V, R <sub>GS</sub> =6Ω
*t <sub>r</sub>	-	20.5	-		
*t <sub>d(OFF)</sub>	-	62.7	-		
*t <sub>f</sub>	-	16.2	-		
C <sub>iss</sub>	-	2647	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f=1MHz
C <sub>oss</sub>	-	358	-		
C <sub>rss</sub>	-	33	-		
R <sub>g</sub>	-	0.7	-	Ω	f=1MHz
<b>Source-Drain Diode</b>					
*I <sub>S</sub>	-	-	33	A	
*I <sub>SM</sub>	-	-	132		
*V <sub>SD</sub>	-	0.82	1.2	V	I <sub>S</sub> =15A, V <sub>GS</sub> =0V
*t <sub>rr</sub>	-	40	-	ns	V <sub>GS</sub> =0V, I <sub>F</sub> =15A, dI <sub>F</sub> /dt=100A/μs
*Q <sub>rr</sub>	-	57	-	nC	

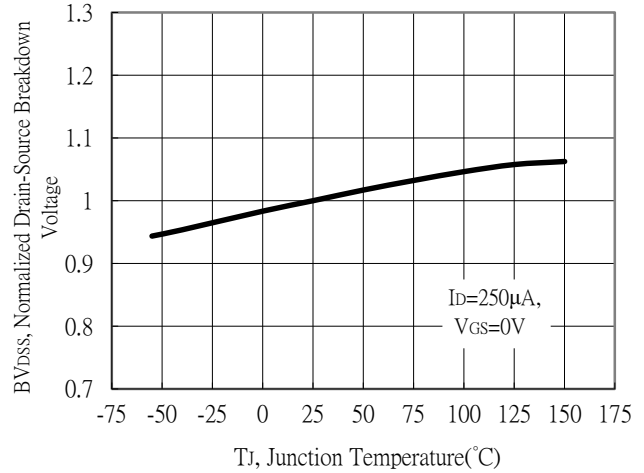
\*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

## Typical Characteristics

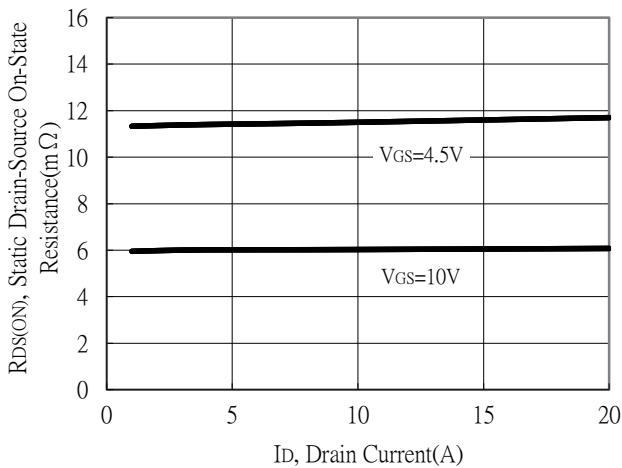
Typical Output Characteristics



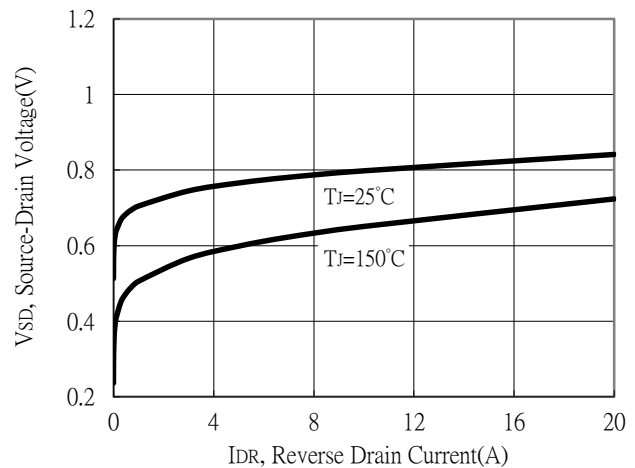
Breakdown Voltage vs Ambient Temperature



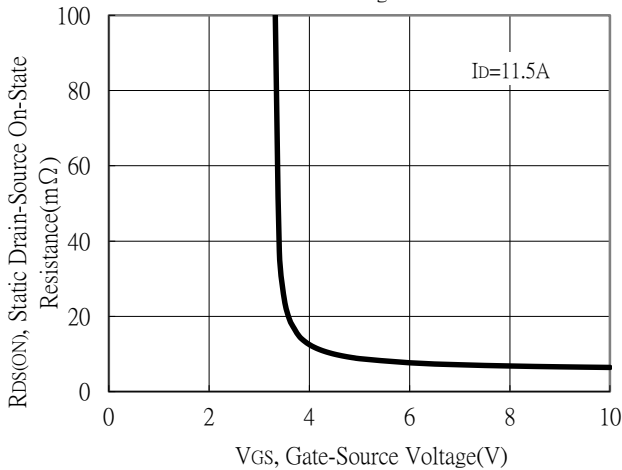
Static Drain-Source On-State resistance vs Drain Current



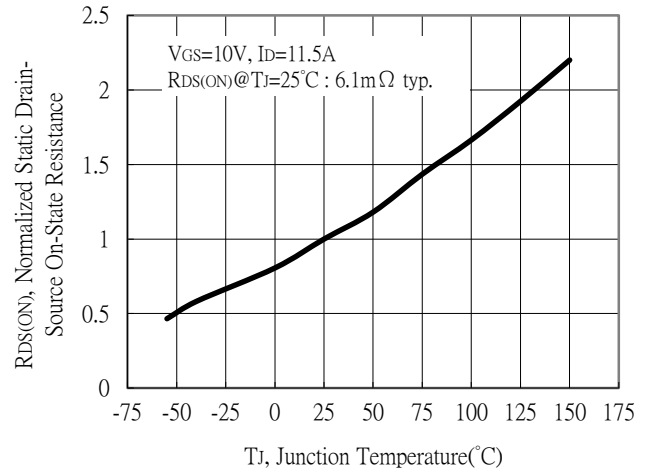
Reverse Drain Current vs Source-Drain Voltage



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

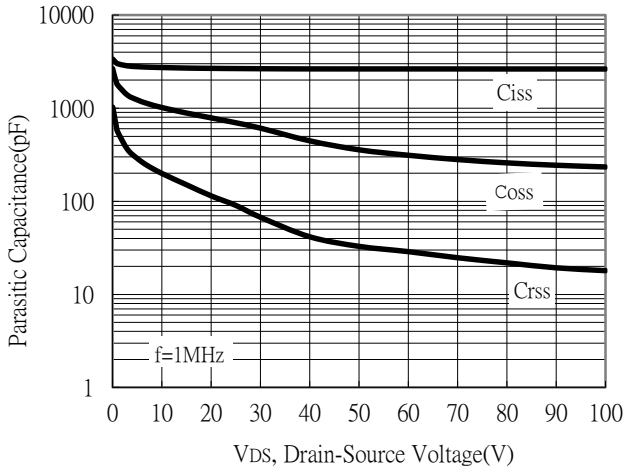


Drain-Source On-State Resistance vs Junction Temperature

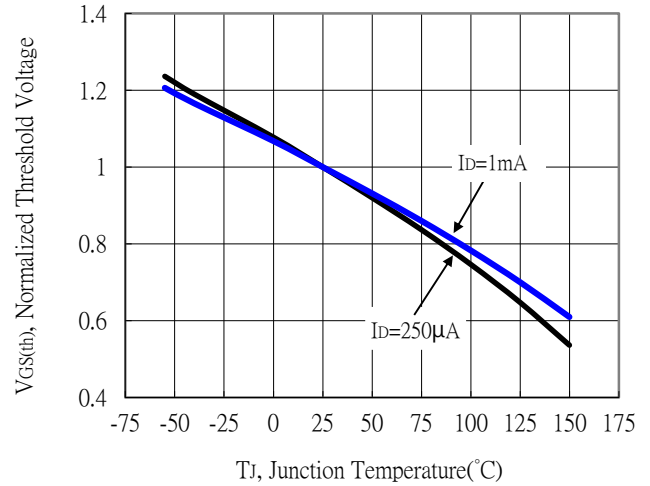


## Typical Characteristics(Cont.)

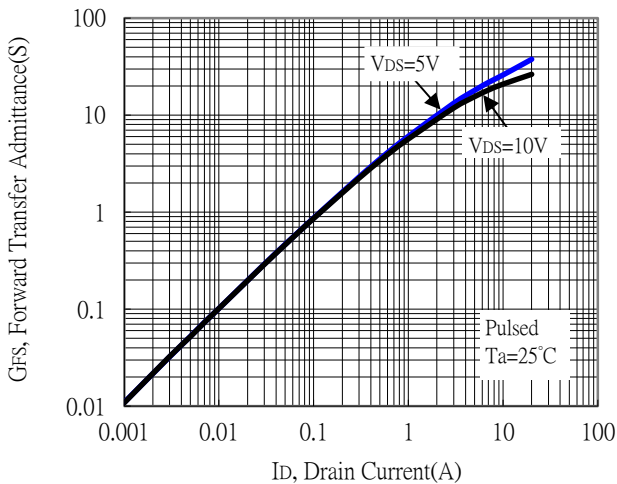
Capacitance vs Drain-to-Source Voltage



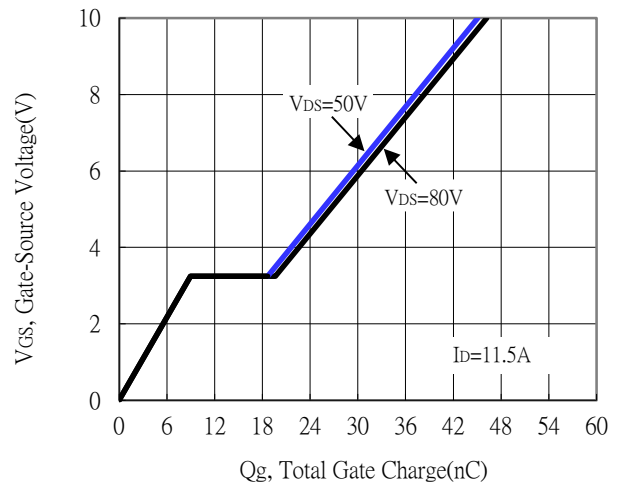
Threshold Voltage vs Junction Temperature



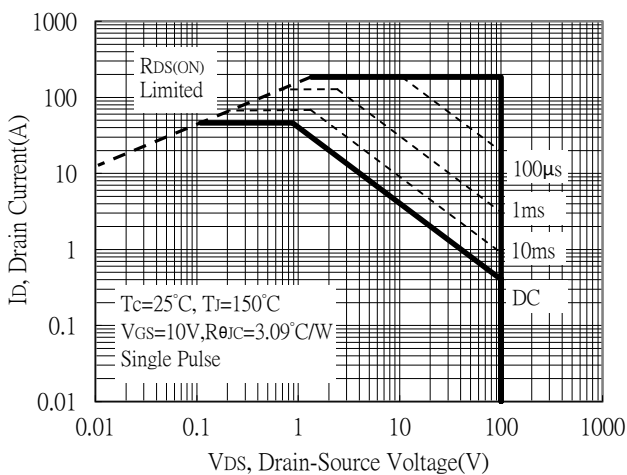
Forward Transfer Admittance vs Drain Current



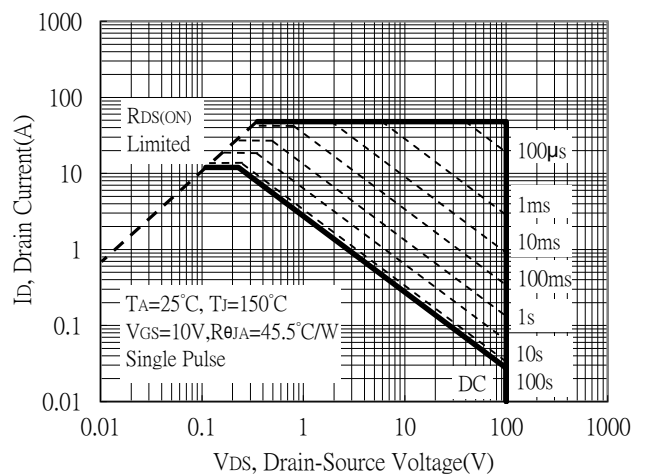
Gate Charge Characteristics



Maximum Safe Operating Area



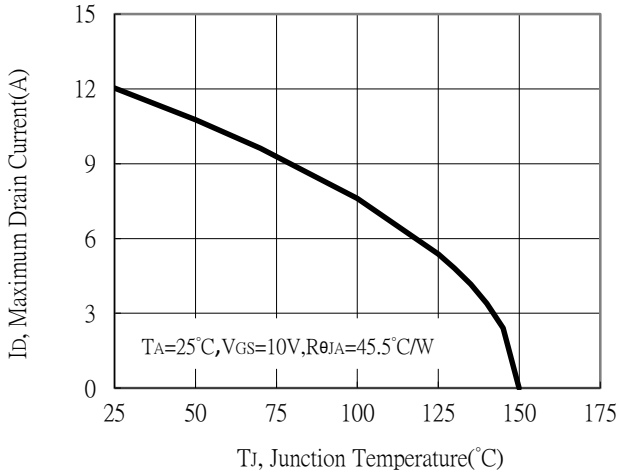
Maximum Safe Operating Area



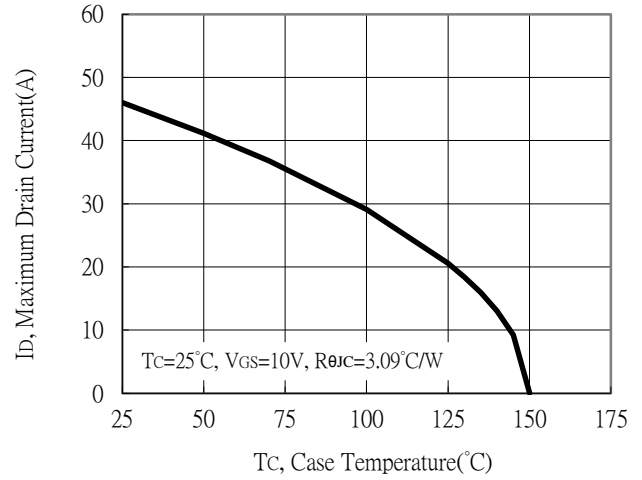


### Typical Characteristics (Cont.)

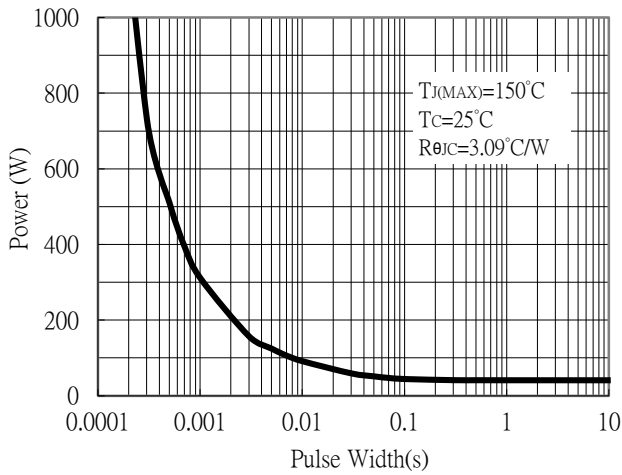
Maximum Drain Current vs Junction Temperature



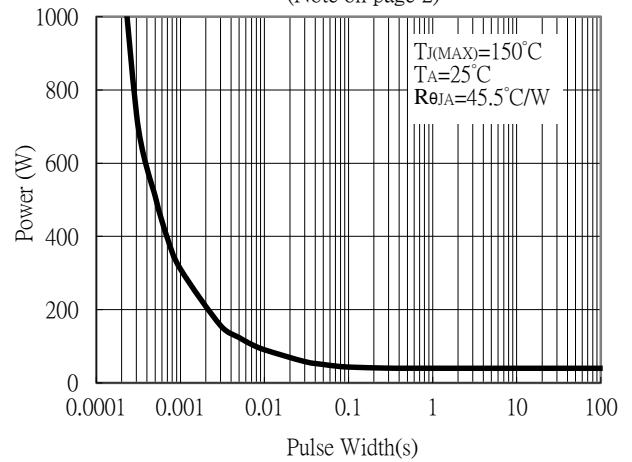
Maximum Drain Current vs Case Temperature



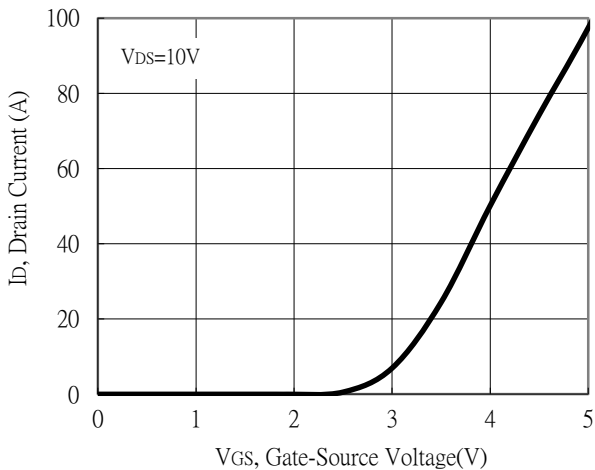
Single Pulse Maximum Power Dissipation



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

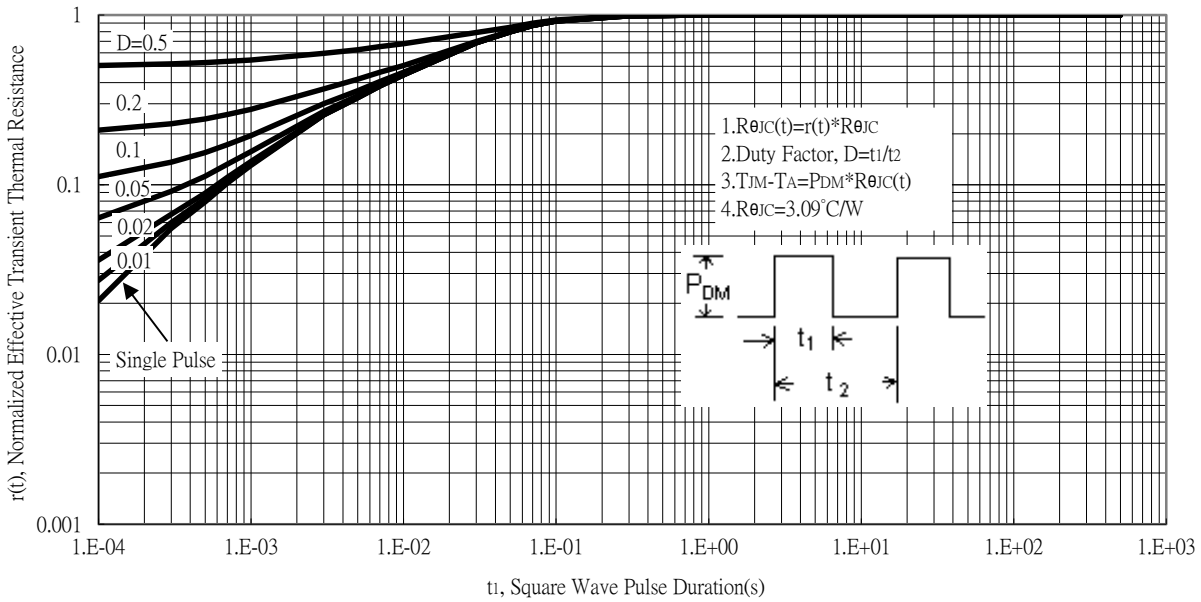


Typical Transfer Characteristics

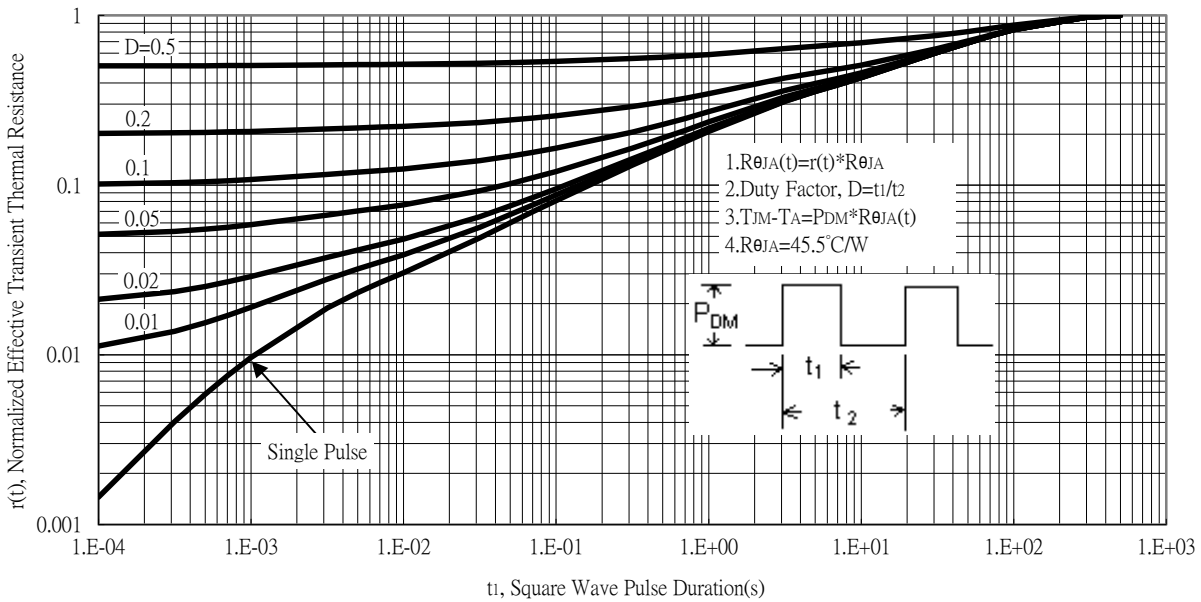


**Typical Characteristics (Cont.)**

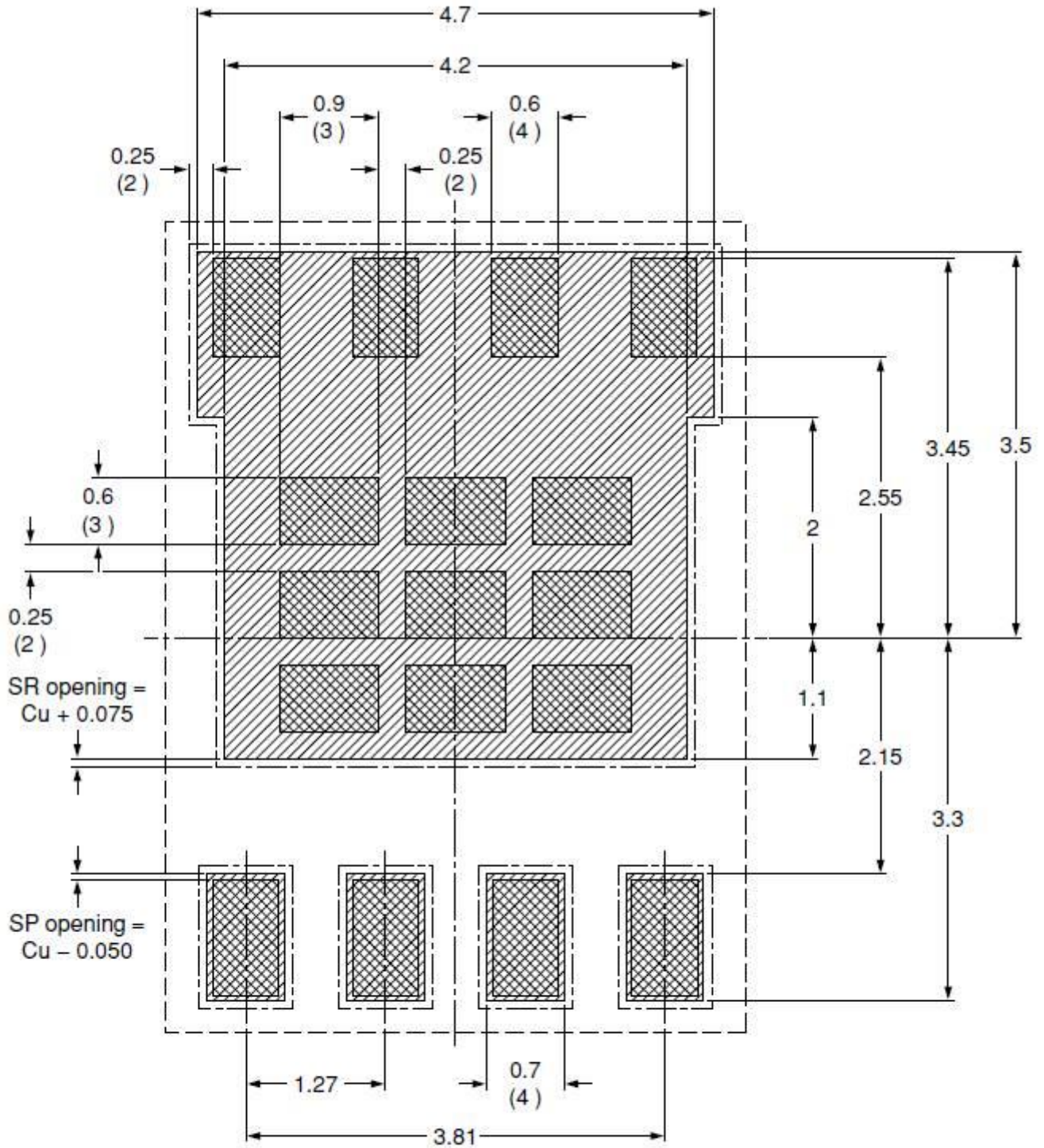
Transient Thermal Response Curves



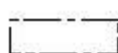
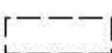


Transient Thermal Response Curves



**Recommended Soldering Footprint & Stencil Design**

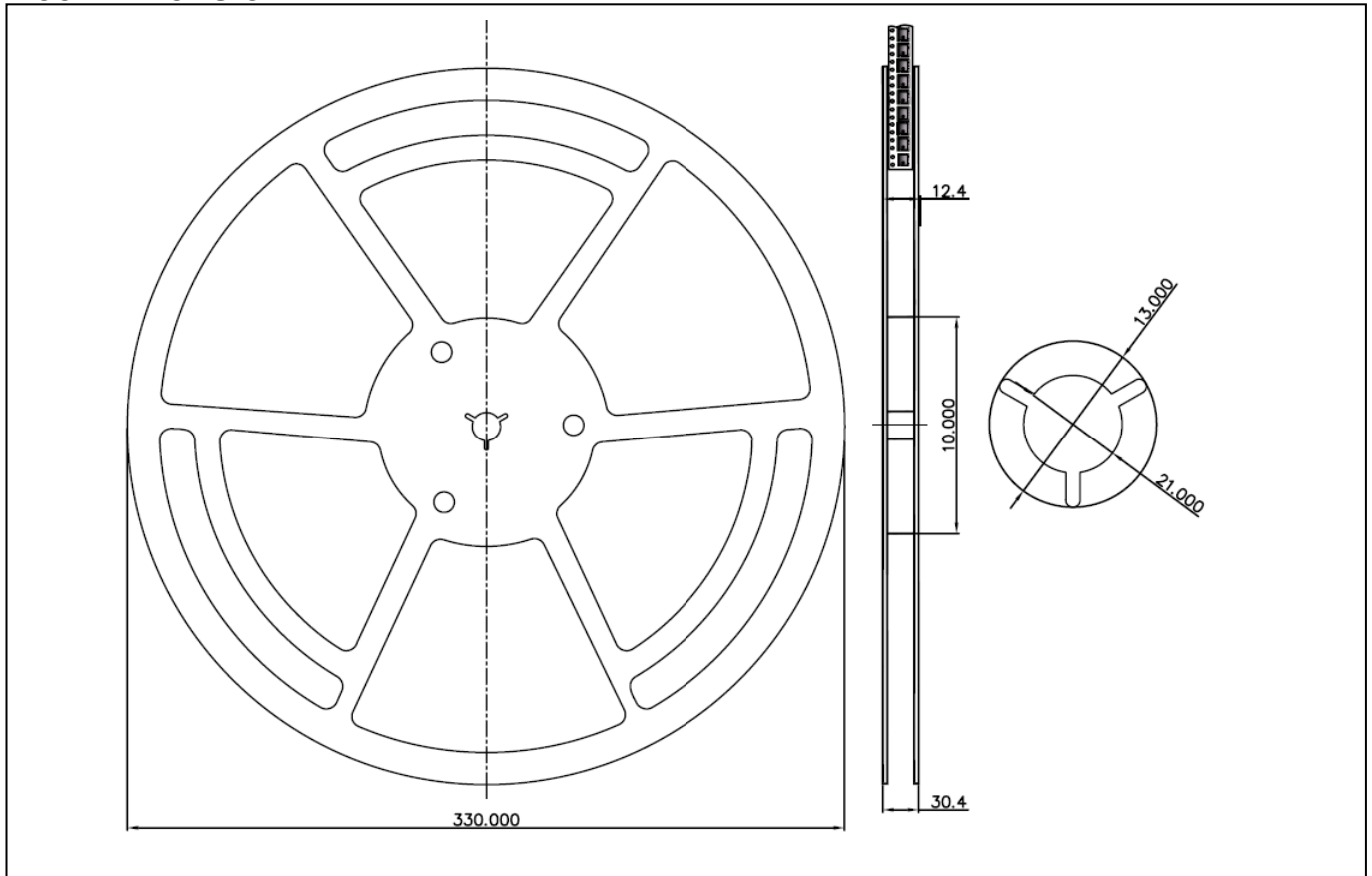


- |   |  |
|---|--|
|  solder lands  |  solder paste<br>125 μm stencil |
|  solder resist |  occupied area                  |

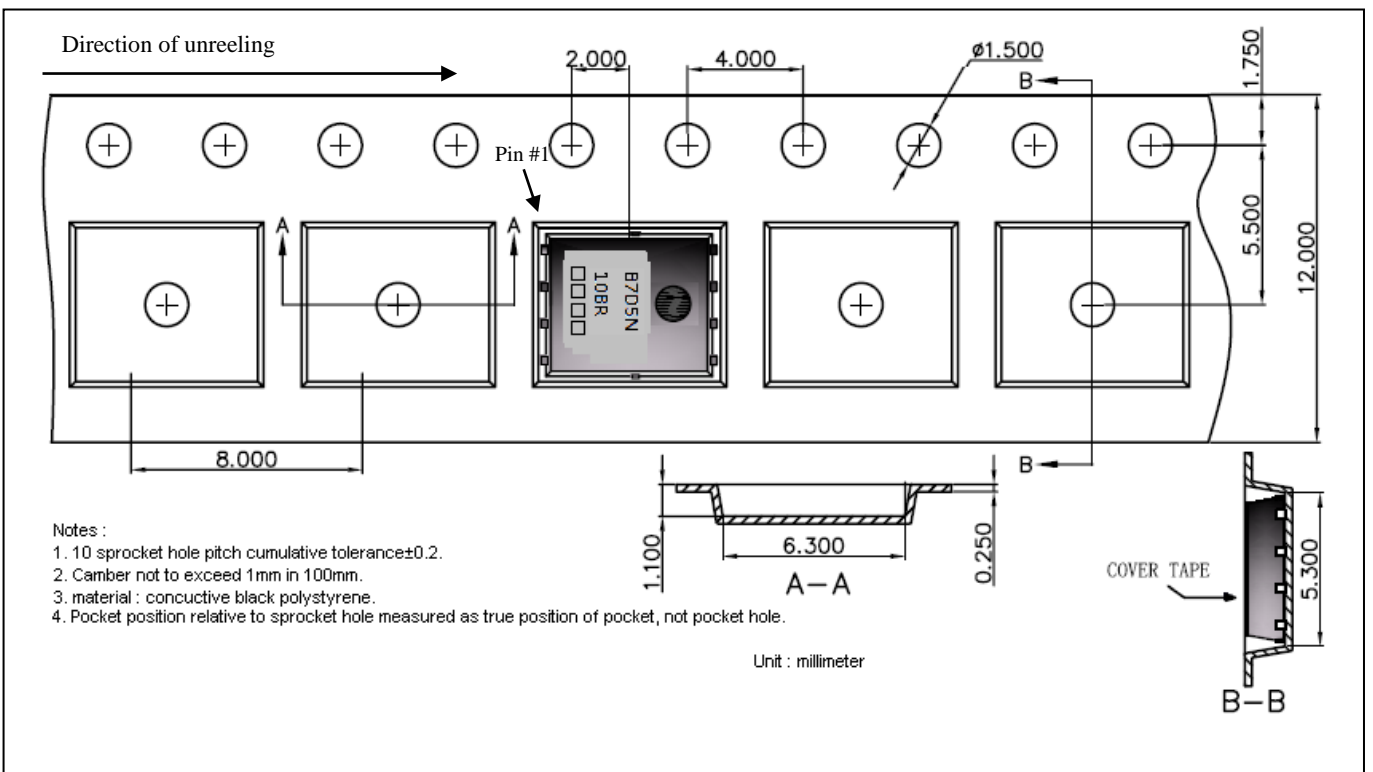
unit : mm



**Reel Dimension**



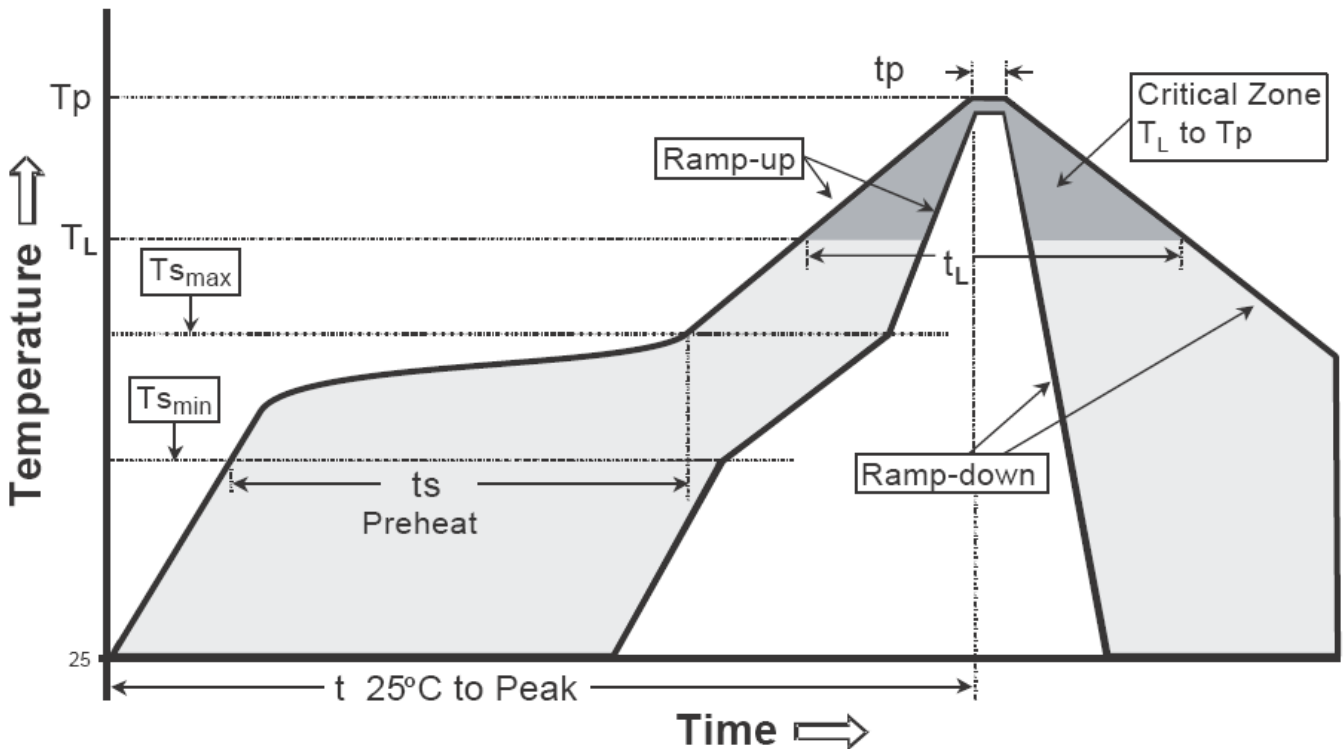
**Carrier Tape Dimension**



**Recommended wave soldering condition**

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

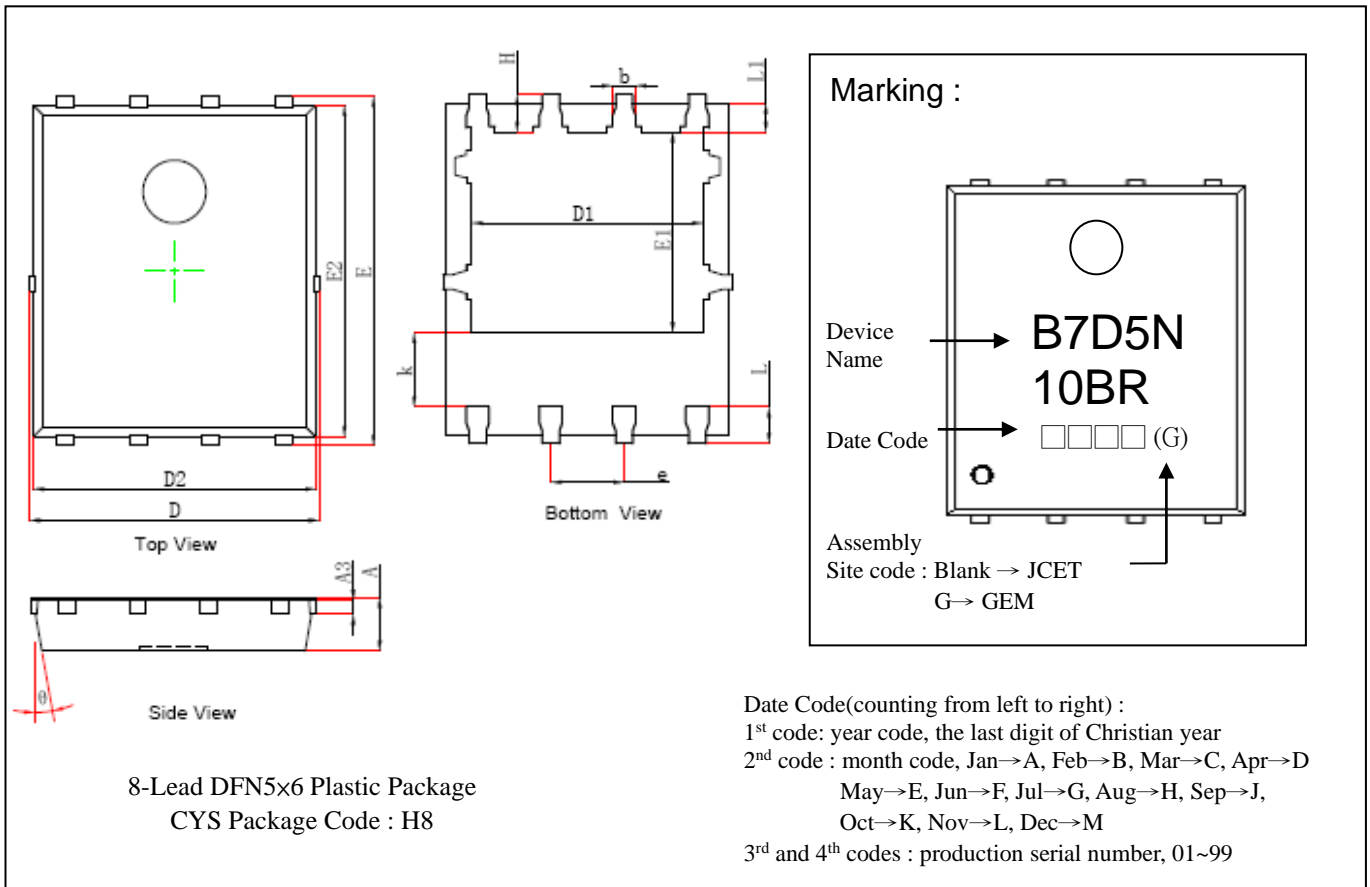
**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (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 :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**



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

**Marking :**

Device Name → **B7D5N 10BR**  
 Date Code → □□□□ (G)  
 Assembly Site code : Blank → JCET  
 G → GEM

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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