

# N-Channel Enhancement Mode Power MOSFET

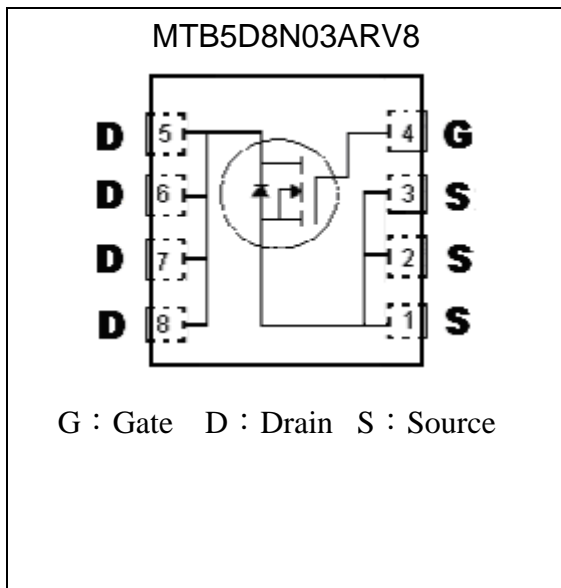
## MTB5D8N03ARV8

$BV_{DSS}$		30V
$I_D @ V_{GS}=10V, T_A=25^\circ C$		13.9A
$I_D @ V_{GS}=10V, T_C=25^\circ C$		39A
$R_{DS(on)(TYP)}$	$V_{GS}=10V, I_D=12A$	$6m\Omega$
	$V_{GS}=4.5V, I_D=9A$	$9.7m\Omega$

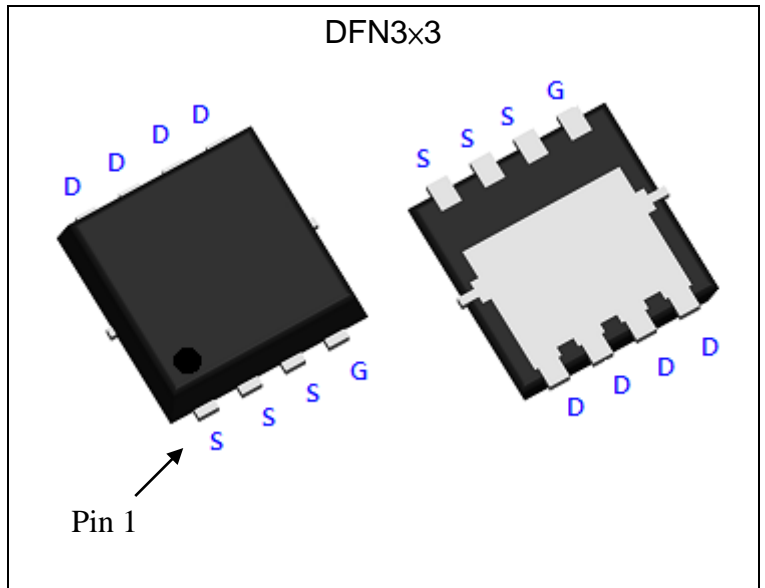
### Features

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

### Equivalent Circuit

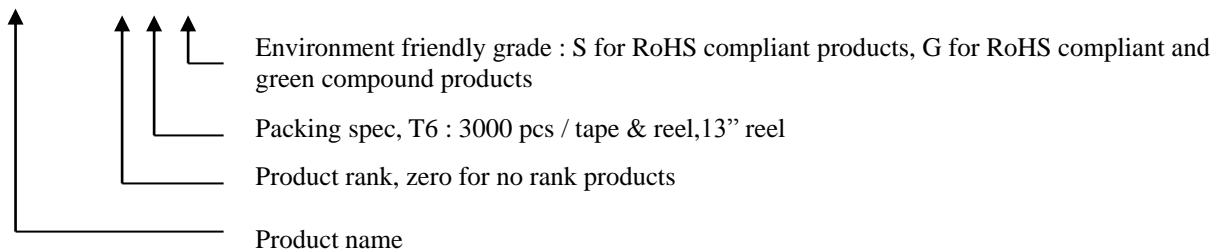


### Outline



### Ordering Information

Device	Package	Shipping
MTB5D8N03ARV8-0-T6-G	DFN3x3 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel





**Absolute Maximum Ratings** (Ta=25°C, unless otherwise specified)

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30	V	
Gate-Source Voltage	V <sub>GS</sub>	±20		
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =25°C	I <sub>D</sub>	39	A	
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =70°C		31.2		
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>A</sub> =25°C		13.6		
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>A</sub> =70°C		10.9		
Pulsed Drain Current	I <sub>DM</sub>	152 *1		
Single Pulse Avalanche Current @ L=0.1mH	I <sub>AS</sub>	20		
Avalanche Energy @ L=1mH, I <sub>D</sub> =12A, V <sub>DD</sub> =25V	E <sub>AS</sub>	72 *3	mJ	
Repetitive Avalanche Energy @ L=0.05mH	E <sub>AR</sub>	3		
Total Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	21	W
		T <sub>C</sub> =100°C	8.4	
	P <sub>DSM</sub>	T <sub>A</sub> =25°C	2.5 *2	
		T <sub>A</sub> =70°C	1.6 *2	
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>	6	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>θJA</sub>	50 *2	

- Note : 1. Pulse width limited by maximum junction temperature.  
 2. Surface mounted on a 1 in<sup>2</sup> pad of 2oz copper. In practice R<sub>θj-a</sub> will be determined by customer's PCB characteristics. 125°C/W when mounted on a minimum pad of 2 oz. copper.  
 3. 100% tested by conditions of L=0.1mH, I<sub>AS</sub>=5A, V<sub>GS</sub>=10V, V<sub>DD</sub>=25V, rated 30V

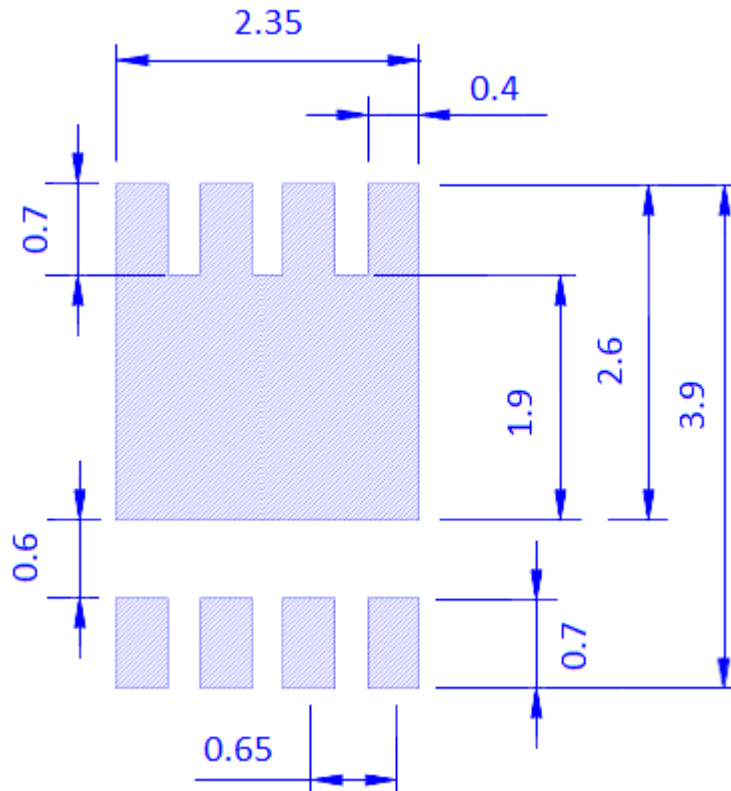
**Characteristics (Tc=25°C, unless otherwise specified)**

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	-	15.4	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =7A
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> =0V, T <sub>j</sub> =85°C
R <sub>DS(ON)</sub> *1	-	6	8	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =12A
	-	9.7	13.6		V <sub>GS</sub> =4.5V, I <sub>D</sub> =9A
<b>Dynamic</b>					
C <sub>iss</sub>	-	774	-	pF	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	518	-		
C <sub>rss</sub>	-	62	-		

Qg(V <sub>GS</sub> =10V) *1,2	-	14.2	-	nC	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =12A
Qg(V <sub>GS</sub> =4.5V) *1,2	-	7.1	-		
Qgs *1,2	-	2.9	-		
Qgd *1,2	-	2.7	-		
t <sub>d</sub> (ON) *1,2	-	9	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V, R <sub>GS</sub> =6Ω
t <sub>r</sub> *1,2	-	13	-		
t <sub>d</sub> (OFF) *1,2	-	25.8	-		
t <sub>f</sub> *1,2	-	6.6	-		
R <sub>g</sub>	-	0.8	-	Ω	f=1MHz
<b>Source-Drain Diode</b>					
I <sub>S</sub> *1	-	-	16	A	
I <sub>SM</sub> *3	-	-	64		
V <sub>SD</sub> *1	-	0.85	1.1	V	I <sub>S</sub> =10A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	17.8	-	ns	I <sub>F</sub> =15A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	6.6	-	nC	

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

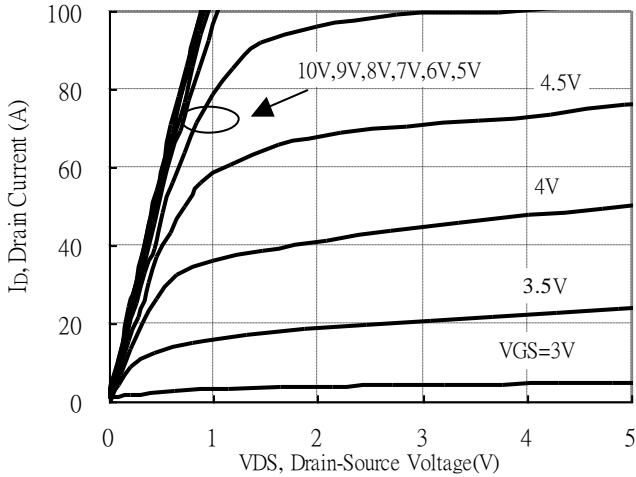
## Recommended Soldering Footprint



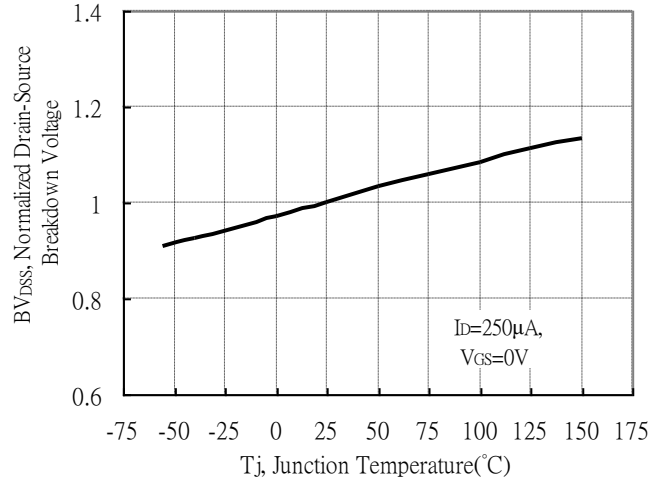
unit : mm

**Typical Characteristics**

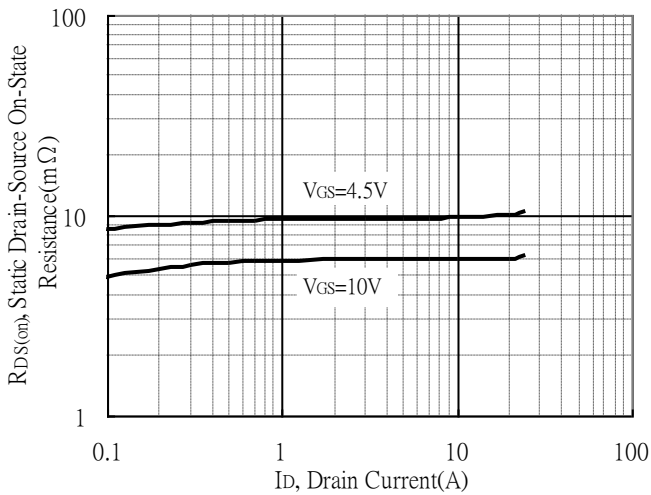
Typical Output Characteristics



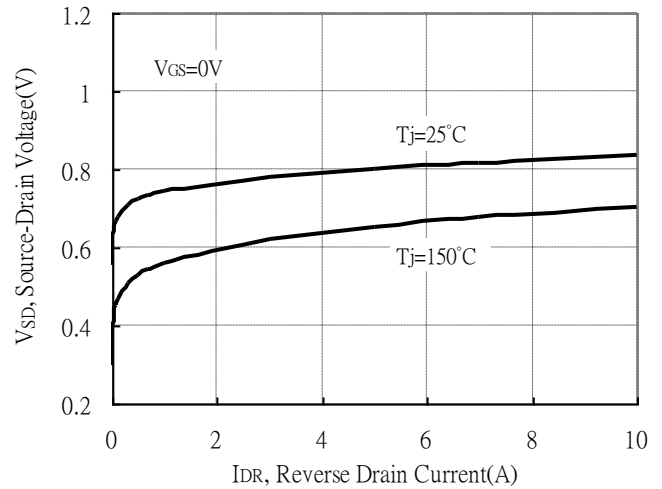
Brekdown Voltage vs Ambient Temperature



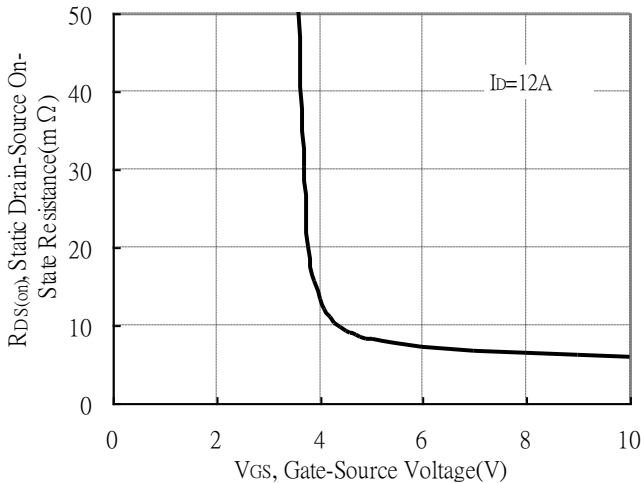
Static Drain-Source On-State resistance vs Drain Current



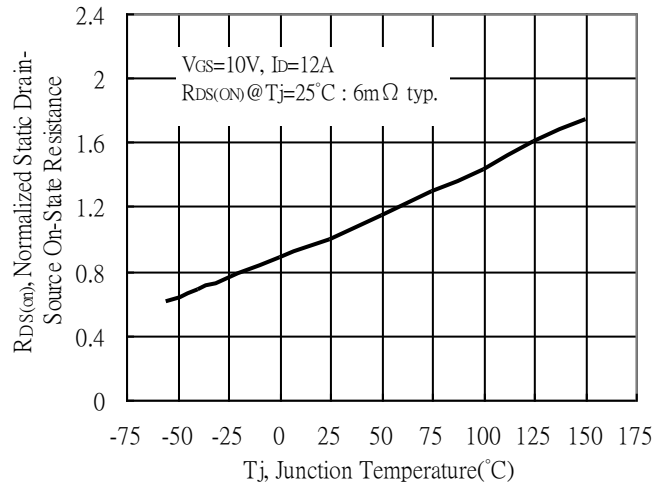
Reverse Drain Current vs Source-Drain Voltage



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

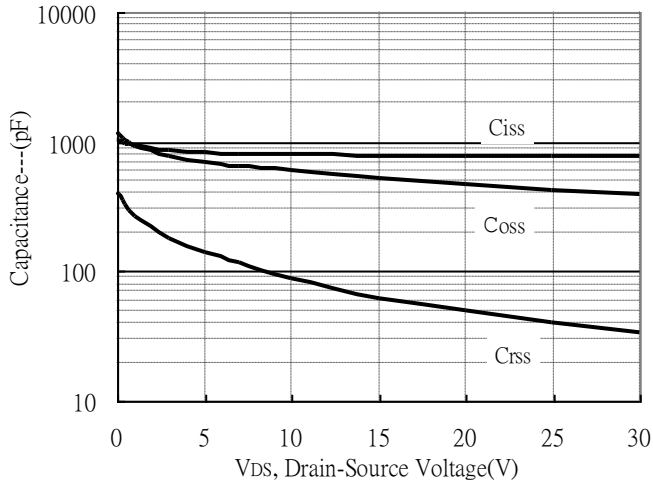


Drain-Source On-State Resistance vs Junction Temperature

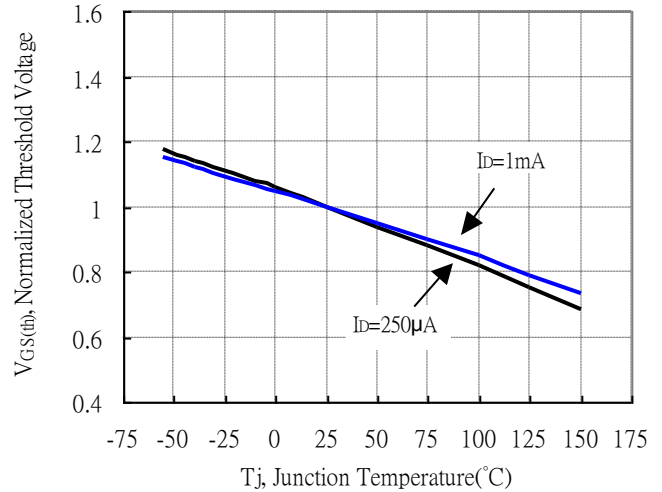


## Typical Characteristics(Cont.)

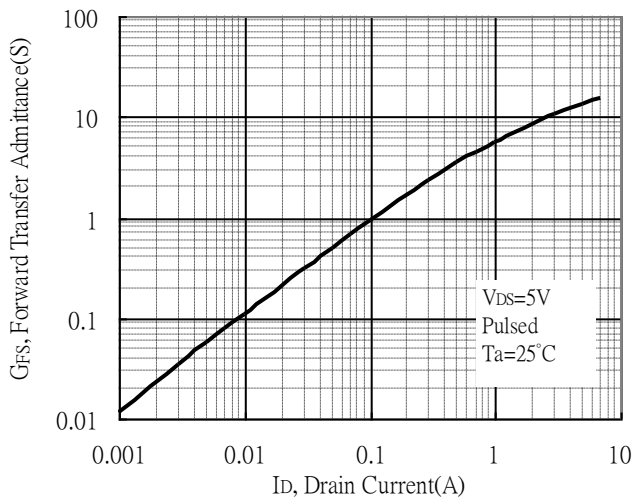
Capacitance vs Drain-to-Source Voltage



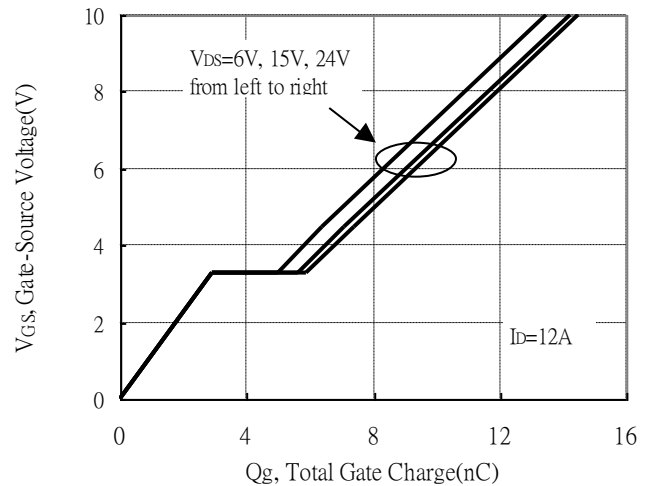
Threshold Voltage vs Junction Temperature



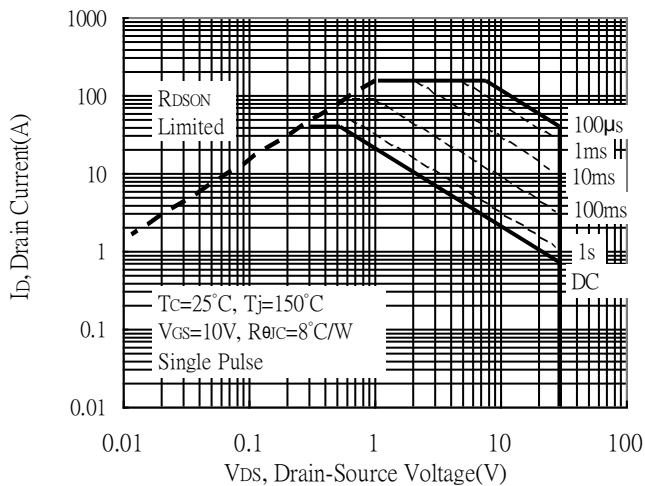
Forward Transfer Admittance vs Drain Current



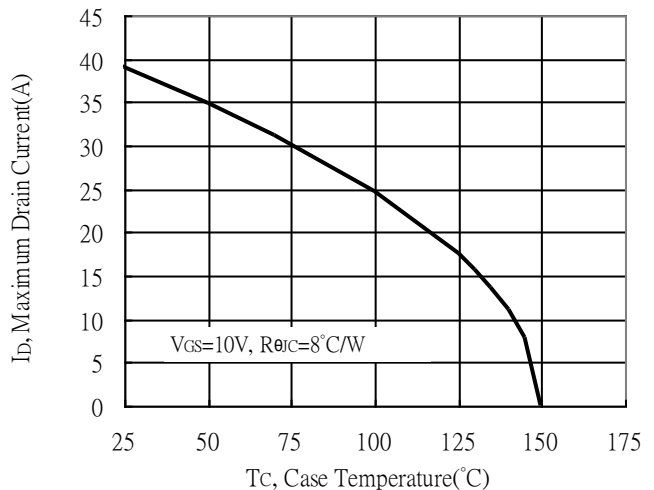
Gate Charge Characteristics



Maximum Safe Operating Area



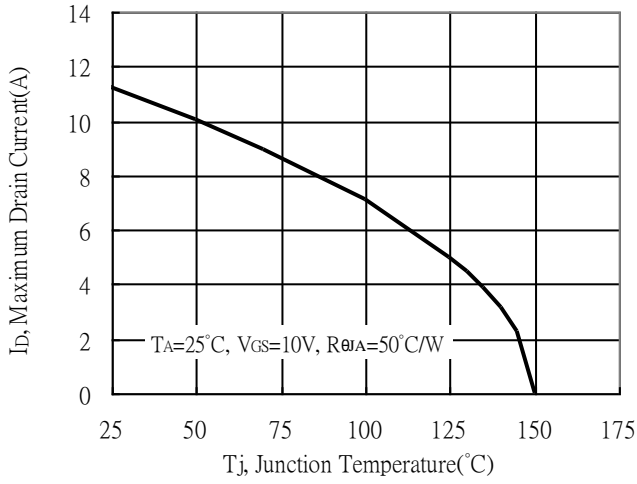
Maximum Drain Current vs Case Temperature



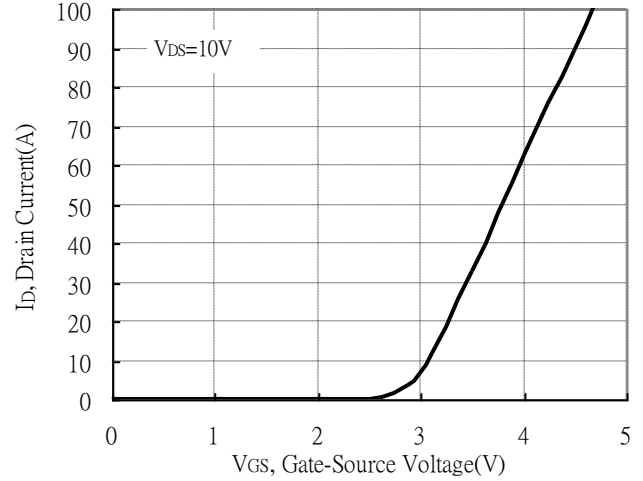


### Typical Characteristics(Cont.)

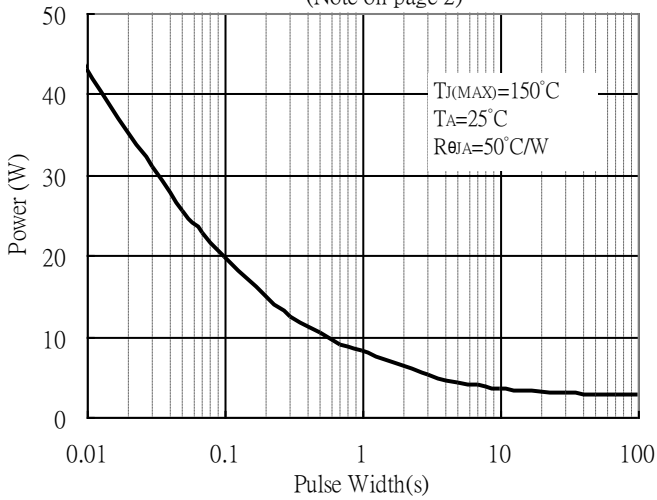
Maximum Drain Current vs Junction Temperature



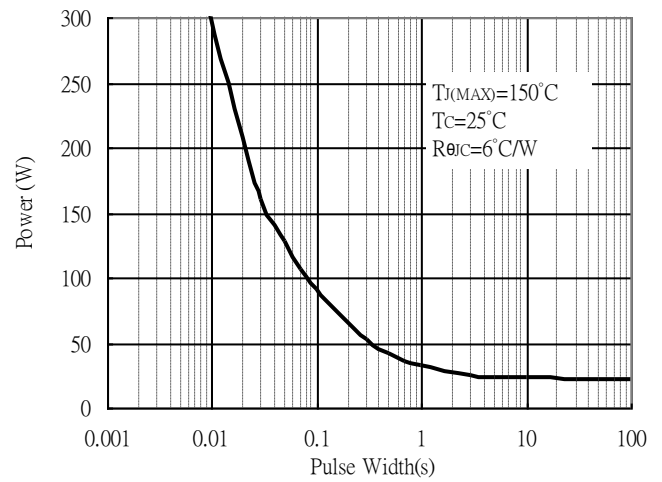
Typical Transfer Characteristics



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

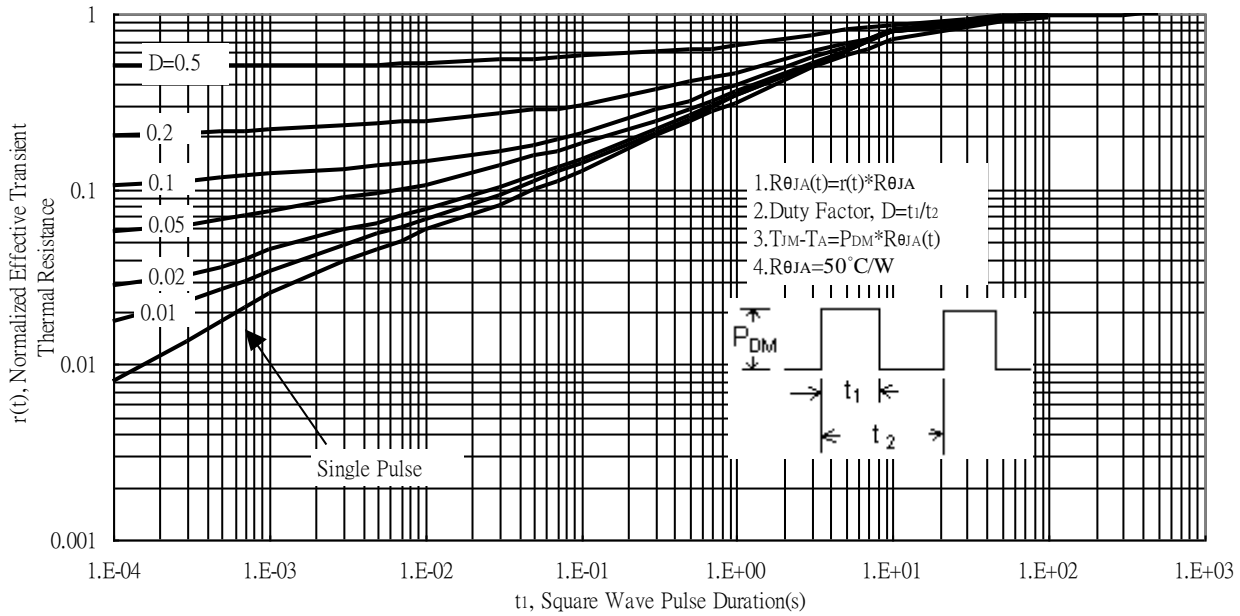


Single Pulse Power Rating, Junction to Case

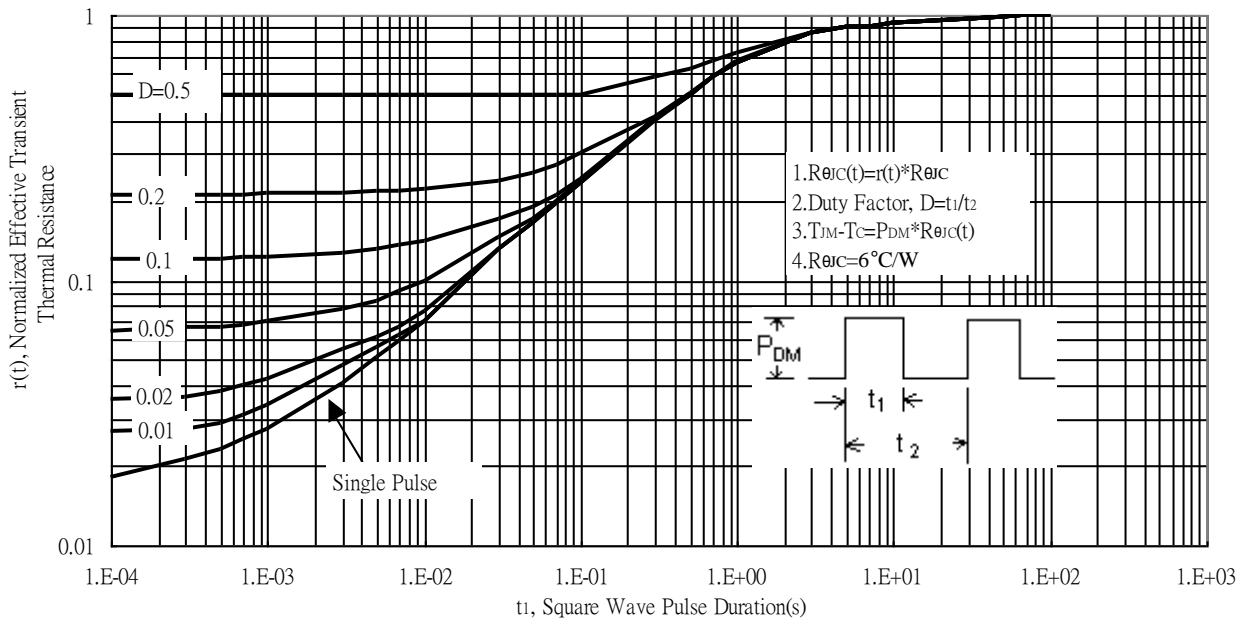


**Typical Characteristics(Cont.)**

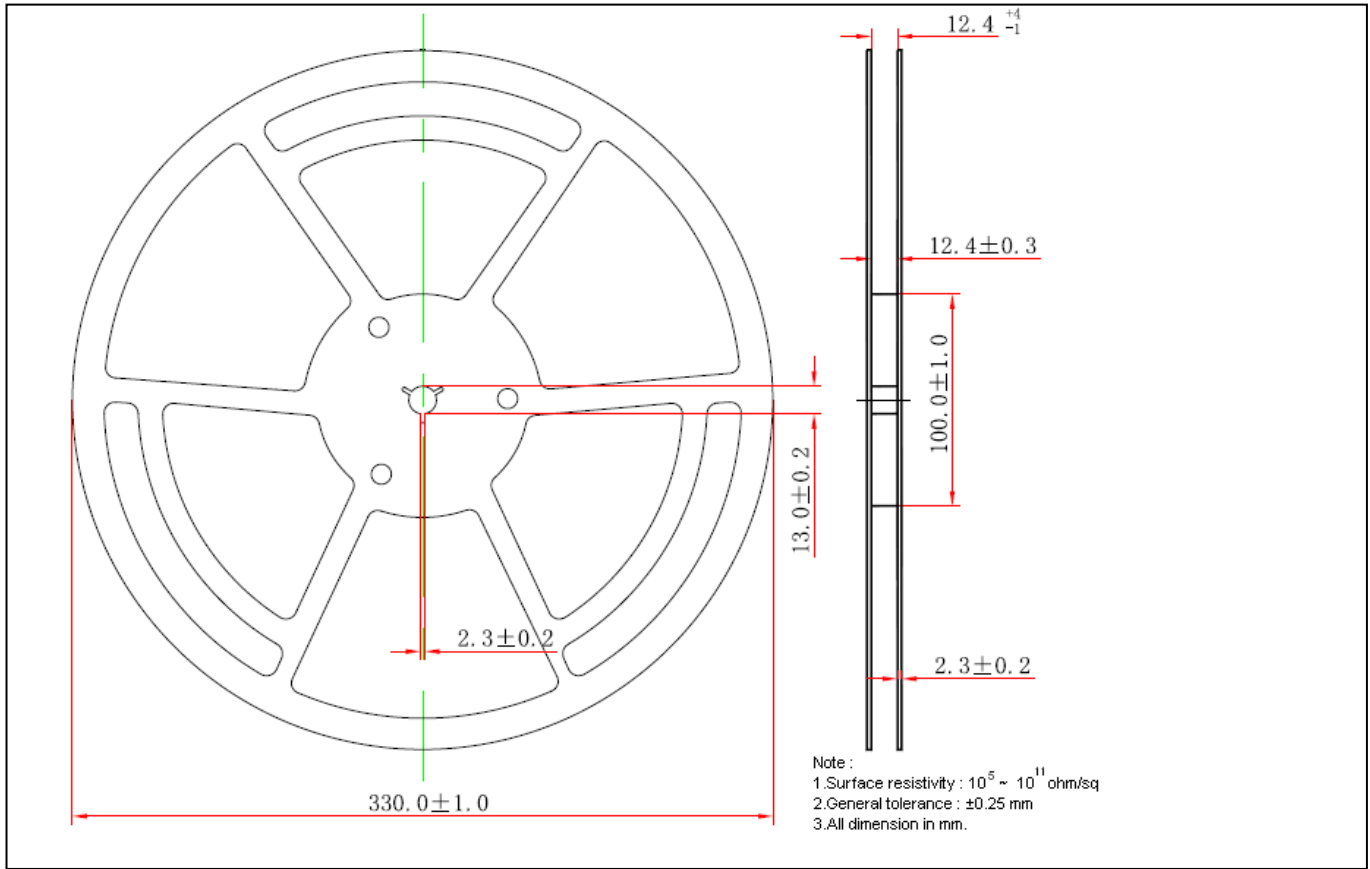
Transient Thermal Response Curves



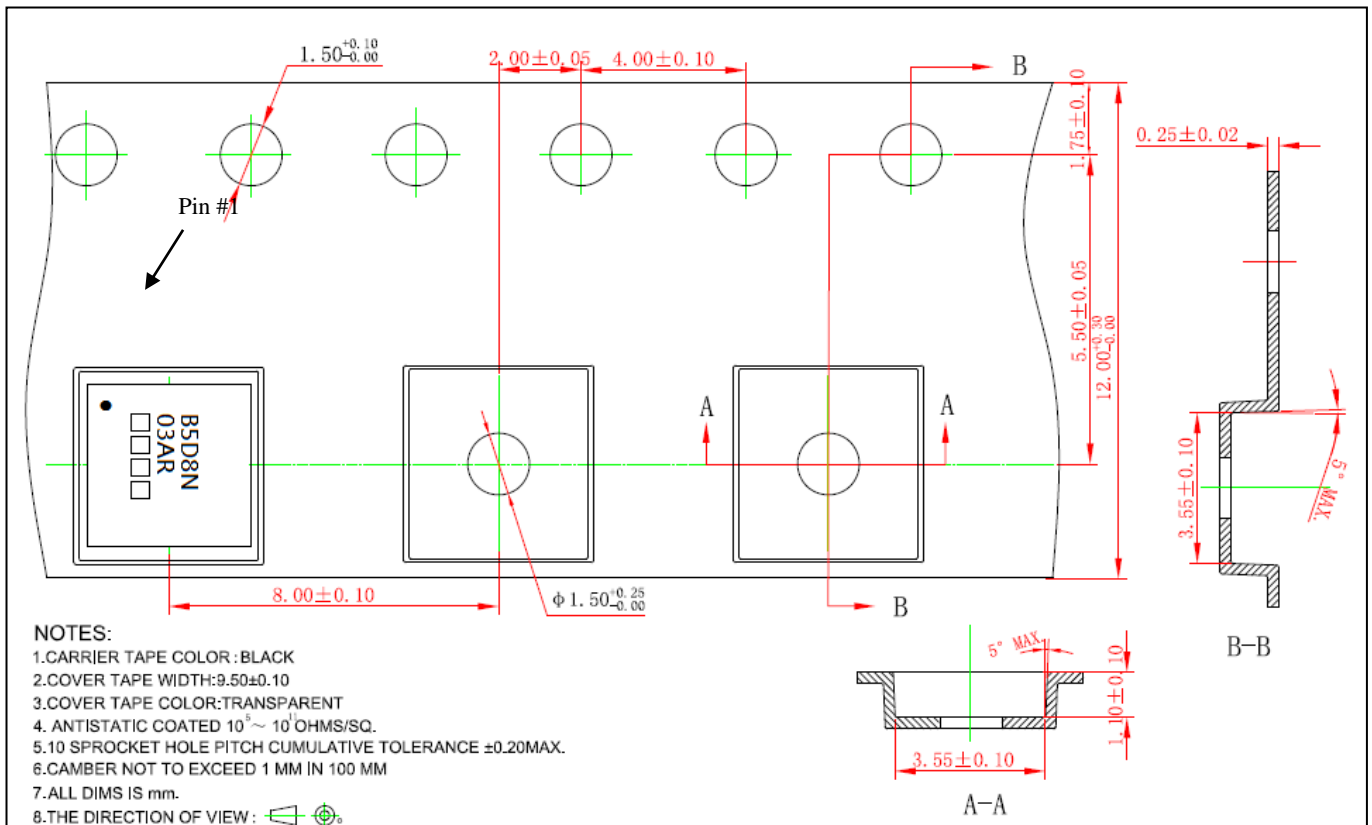
Transient Thermal Response Curves



**Reel Dimension**



**Carrier Tape Dimension**

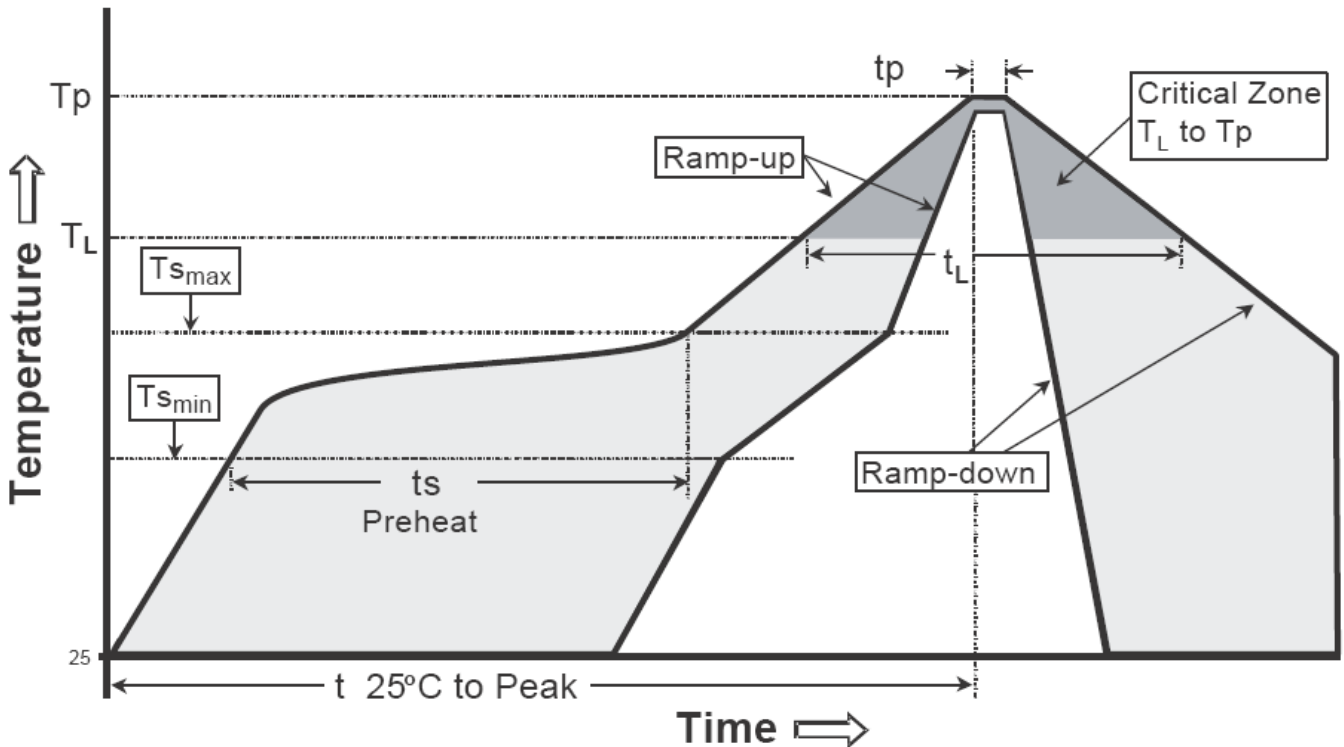




**Recommended wave soldering condition**

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

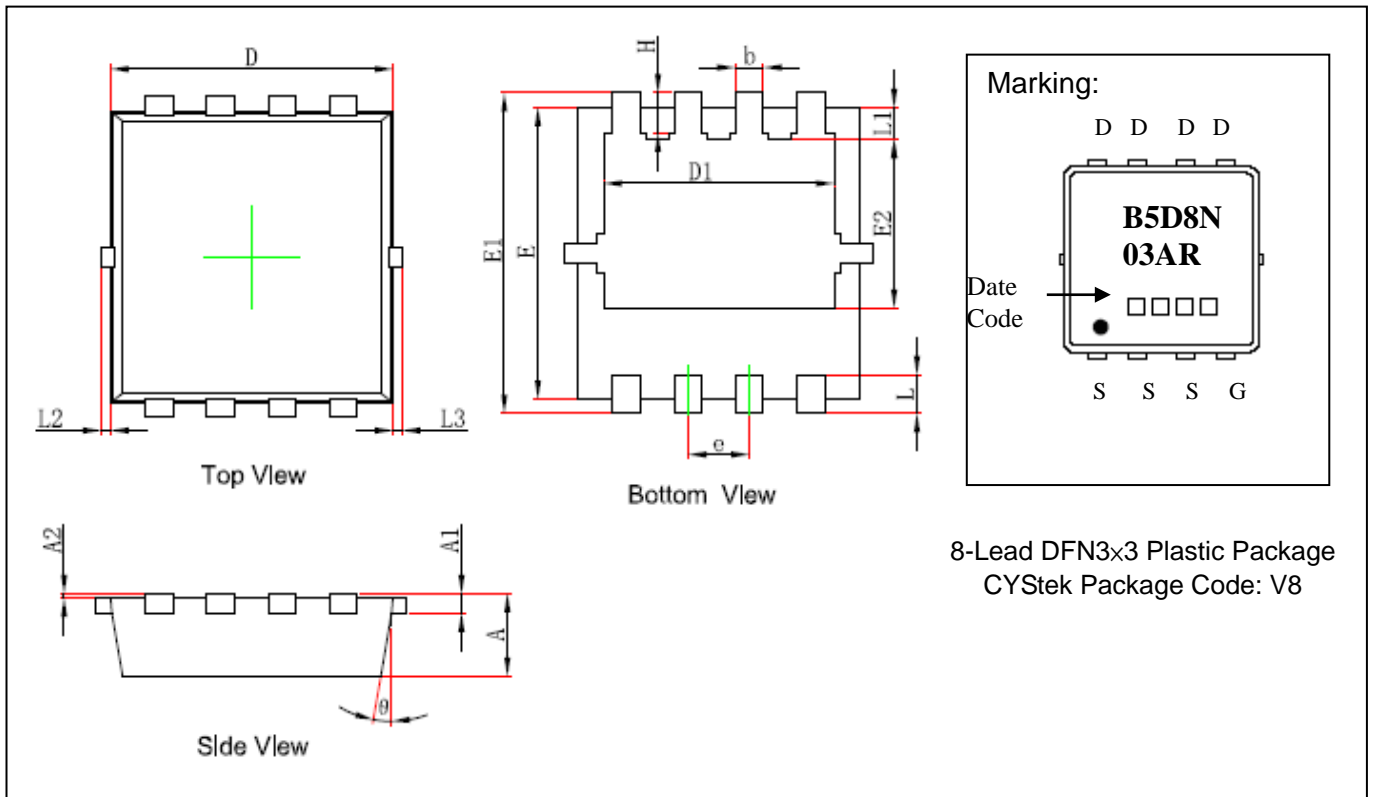
**Recommended temperature profile for IR reflow**



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.

**DFN3x3 Dimension**



\*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.605	0.850	0.026	0.033	b	0.200	0.400	0.008	0.016
A1	0.152	REF	0.006	REF	e	0.550	0.750	0.022	0.030
A2	0.000	0.050	0.000	0.002	L	0.300	0.500	0.012	0.020
D	2.900	3.100	0.114	0.122	L1	0.180	0.480	0.007	0.019
D1	2.300	2.600	0.091	0.102	L2	0.000	0.100	0.000	0.004
E	2.900	3.100	0.114	0.122	L3	0.000	0.100	0.000	0.004
E1	3.150	3.450	0.124	0.136	H	0.315	0.515	0.012	0.020
E2	1.535	1.935	0.060	0.076	θ	9°	13°	9°	13°

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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