

# N-Channel Enhancement Mode Power MOSFET

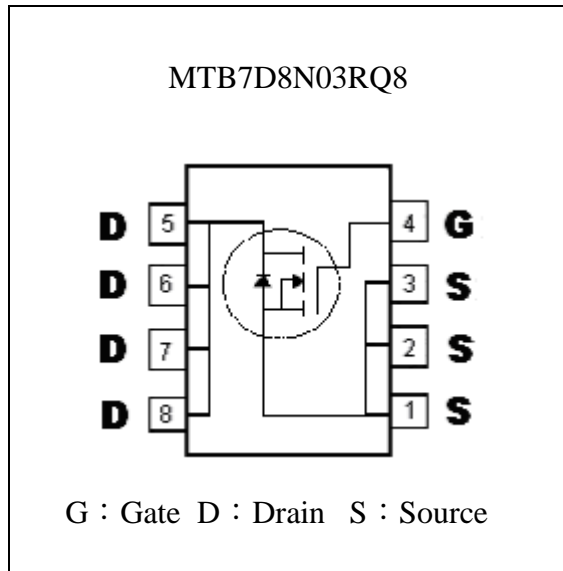
## MTB7D8N03RQ8

### Features

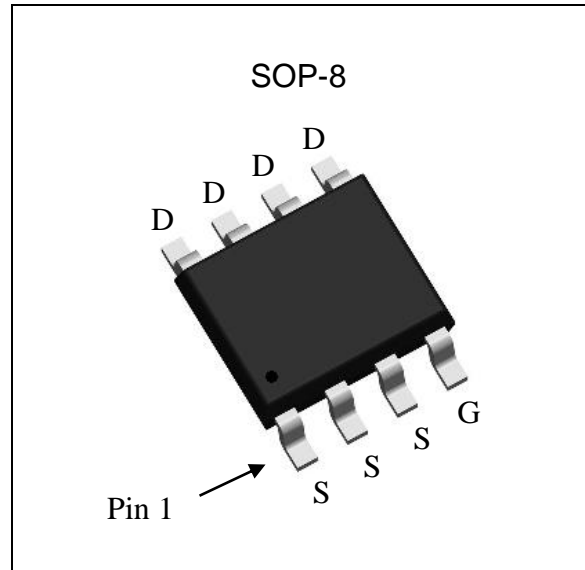
- Simple Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- Pb-free & Halogen-free package

<b>BV<sub>DSS</sub></b>	<b>30V</b>
<b>I<sub>D</sub> @ T<sub>C</sub>=25°C, V<sub>GS</sub>=10V</b>	<b>27A (silicon limit)</b>
<b>I<sub>D</sub> @ T<sub>C</sub>=25°C, V<sub>GS</sub>=10V</b>	<b>21A(package limit)</b>
<b>I<sub>D</sub> @ T<sub>A</sub>=25°C, V<sub>GS</sub>=10V</b>	<b>11A</b>
<b>R<sub>DS(ON)</sub>@ V<sub>GS</sub>=10V, I<sub>D</sub>=12A</b>	<b>6mΩ (typ)</b>
<b>R<sub>DS(ON)</sub>@ V<sub>GS</sub>=4.5V, I<sub>D</sub>=9A</b>	<b>10mΩ (typ)</b>

### Symbol



### Outline



### Ordering Information

Device	Package	Shipping
MTB7D8N03RQ8-0-TF-G	SOP-8 (Pb-free lead plating & halogen-free package)	4000 pcs / Tape & Reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, TF : 4000 pcs / tape & reel, 13" reel

Product rank, zero for no rank products

Product name



**Absolute Maximum Ratings** (Tc=25°C, unless otherwise noted)

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30	V	
Gate-Source Voltage	V <sub>GS</sub>	±20		
Continuous Drain Current @ Tc=25°C, VGS=10V(silicon limit)	I <sub>D</sub>	27	A	
Continuous Drain Current @ Tc=25°C, VGS=10V(package limit)		21		
Continuous Drain Current @ Tc=100°C, VGS=10V		17		
Continuous Drain Current @ TA=25°C, VGS=10V		11		
Continuous Drain Current @ TA=70°C, VGS=10V		9		
Pulsed Drain Current		I <sub>DM</sub>		108 *1
Avalanche Current @ L=0.1mH	I <sub>AS</sub>	13		
Avalanche Energy @ L=0.5mH	E <sub>AS</sub>	12	mJ	
Total Power Dissipation	P <sub>D</sub>	TA=25°C	2	W
		TA=70°C	1.2	
Operating Junction and Storage Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55~+150	°C	

Note : \*1. Pulse width limited by maximum junction temperature

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>θJC</sub>	10.9	°C/W
Thermal Resistance, Junction-to-ambient (Note)	R <sub>θJA</sub>	62.5	

Note : When mounted on a 1 in<sup>2</sup> pad of 2 oz copper, t≤10s; 125° C/W when mounted on minimum pad.

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

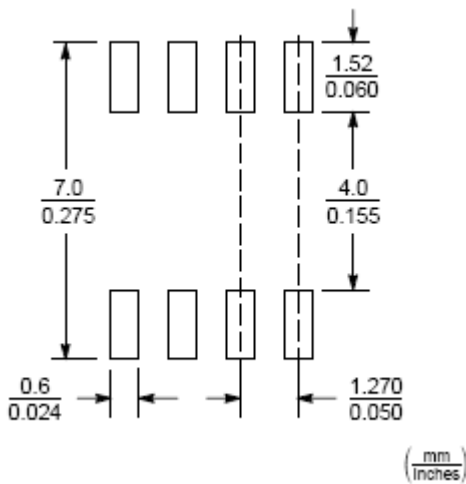
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1	-	2.5		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub>	-	13.6	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =10A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =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>	-	6	8	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =12A
	-	10	14		V <sub>GS</sub> =4.5V, I <sub>D</sub> =9A
<b>Dynamic</b>					
Q <sub>g</sub> *1, 2	-	10.5	-	nC	V <sub>DS</sub> =15V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V
Q <sub>gs</sub> *1, 2	-	2.1	-		
Q <sub>gd</sub> *1, 2	-	2	-		
C <sub>iss</sub>	-	564	-	pF	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	431	-		
C <sub>rss</sub>	-	51	-		

**Characteristics (Cont.  $T_j=25^{\circ}\text{C}$ , unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Dynamic</b>					
$t_{d(ON)}$ *1, 2	-	7.2	-	ns	$V_{DS}=15\text{V}, I_D=1\text{A}, V_{GS}=10\text{V}, R_G=6\Omega$
$t_r$ *1, 2	-	17.3	-		
$t_{d(OFF)}$ *1, 2	-	23.8	-		
$t_f$ *1, 2	-	16.7	-		
<b>Source-Drain Diode Ratings and Characteristics</b>					
$I_S$ *1	-	-	10	A	
$I_{SM}$ *3	-	-	40		
$V_{SD}$ *1	-	0.84	1.2	V	$I_S=10\text{A}, V_{GS}=0\text{V}$
$t_{rr}$	-	14.7	-	ns	$I_F=12\text{A}, dI_F/dt=100\text{A}/\mu\text{s}$
$Q_{rr}$	-	4.4	-	nC	

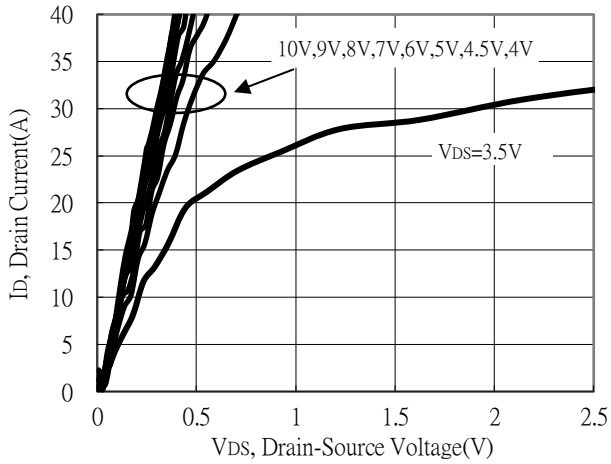
Note : \*1.Pulse Test : Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$   
 \*2.Independent of operating temperature  
 \*3.Pulse width limited by maximum junction temperature.

**Recommended Soldering Footprint**

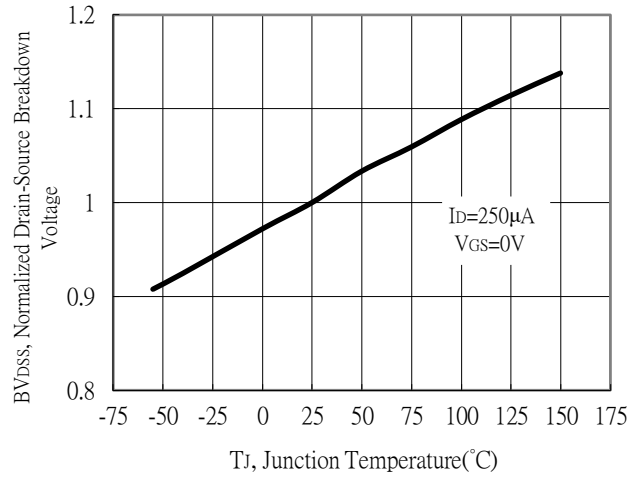


## Typical Characteristics

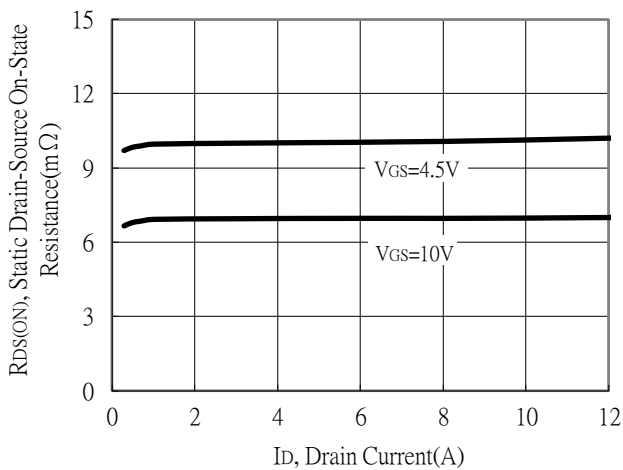
Typical Output Characteristics



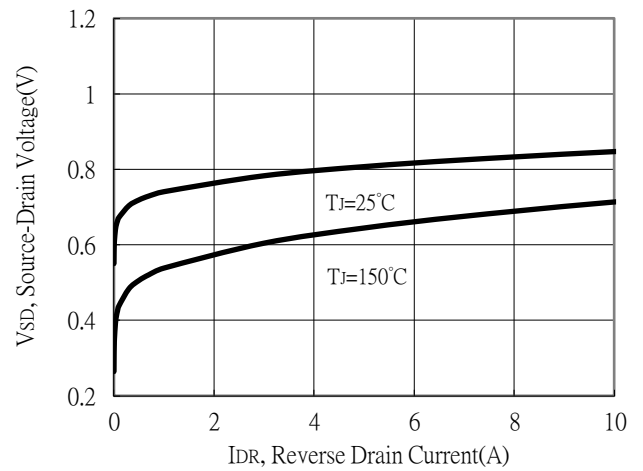
Breakdown Voltage vs Ambient Temperature



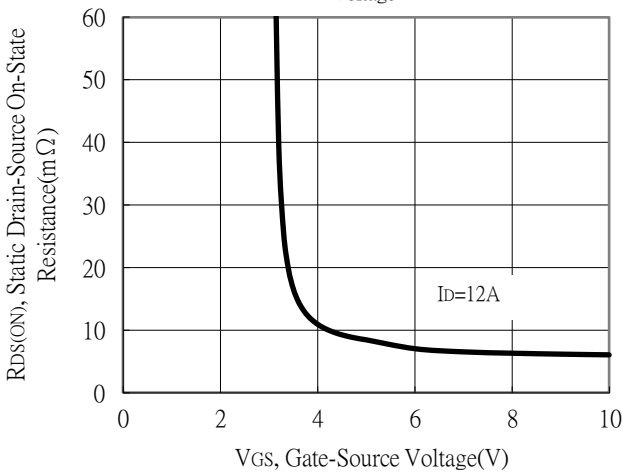
Static Drain-Source On-State resistance vs Drain Current



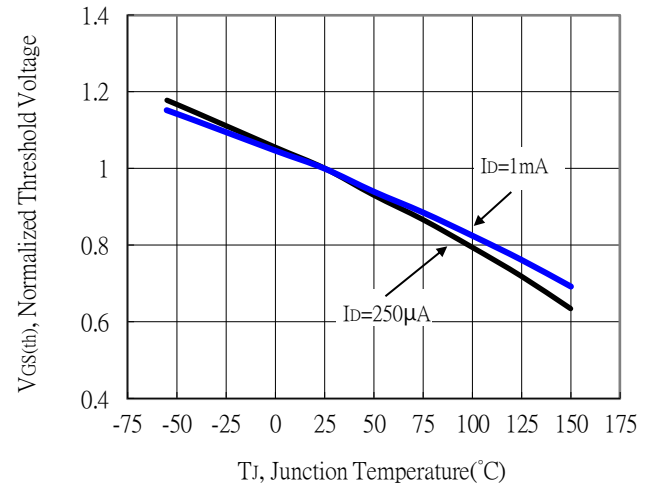
Reverse Drain Current vs Source-Drain Voltage



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

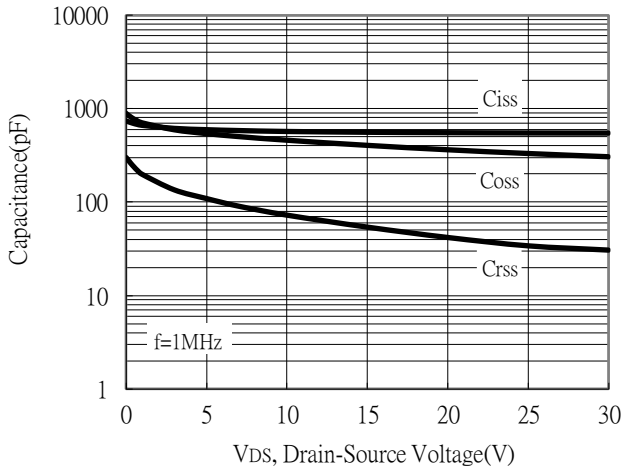


Threshold Voltage vs Junction Temperature

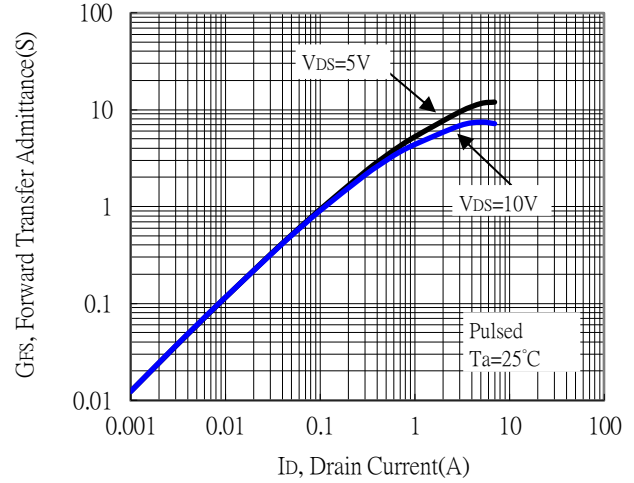


**Typical Characteristics(Cont.)**

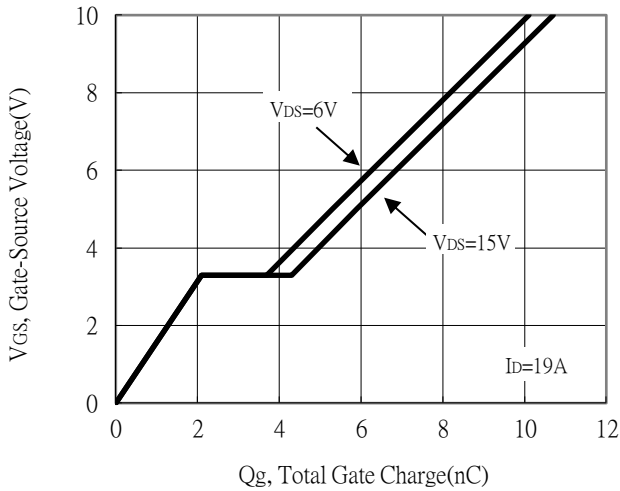
Capacitance vs Drain-to-Source Voltage



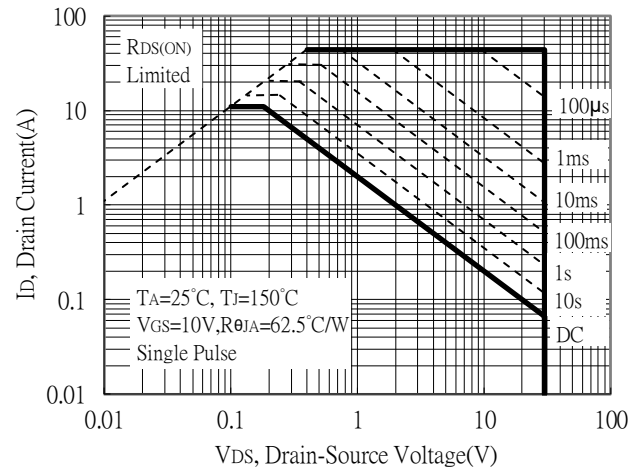
Forward Transfer Admittance vs Drain Current



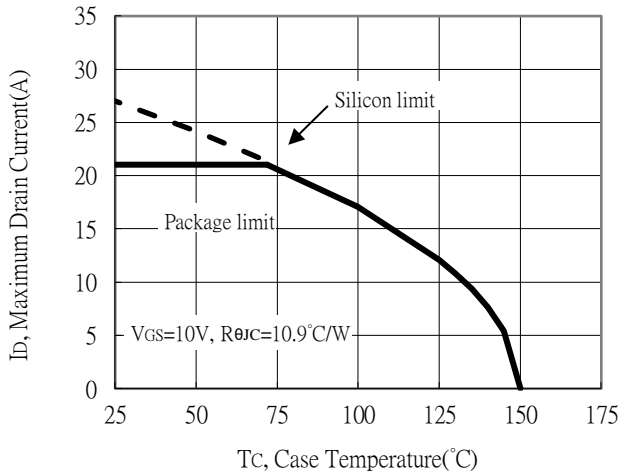
Gate Charge Characteristics



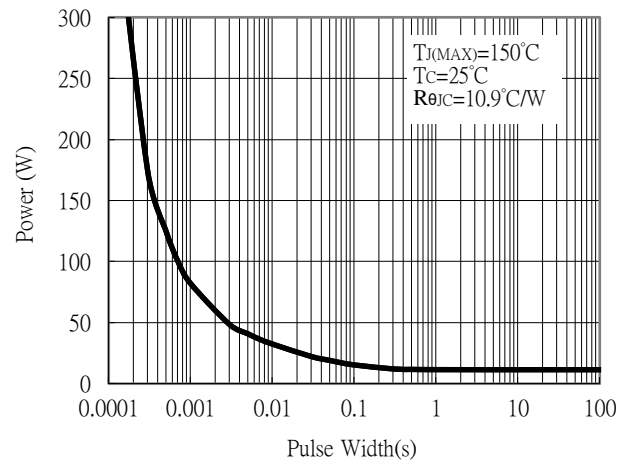
Maximum Safe Operating Area



Maximum Drain Current vs Case Temperature

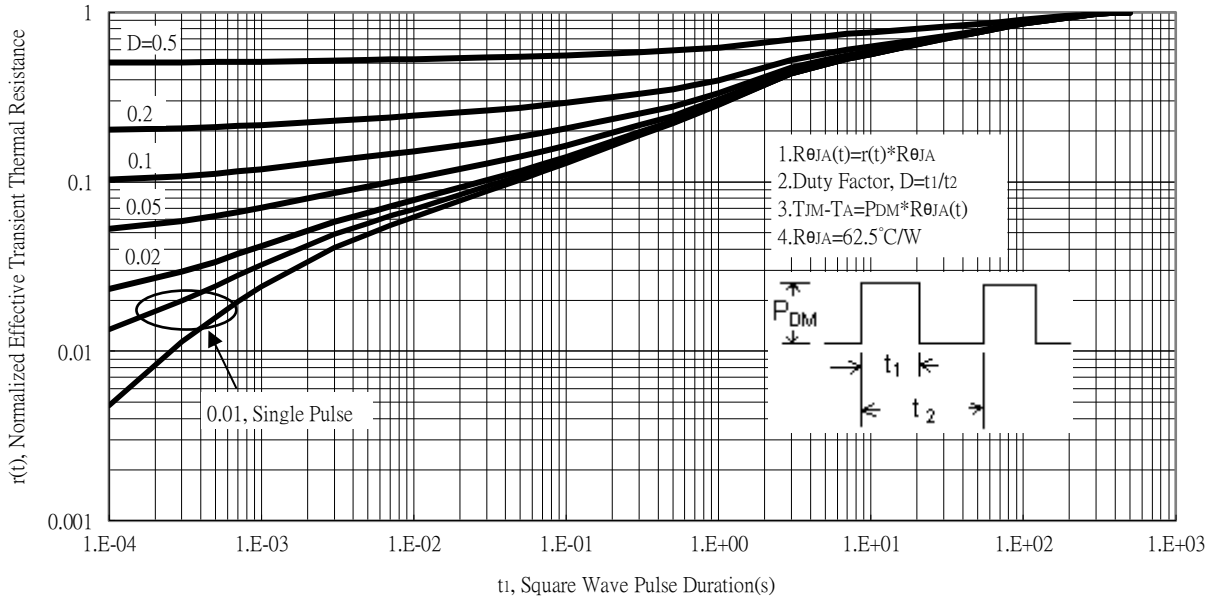


Single Pulse Power Rating, Junction to Case

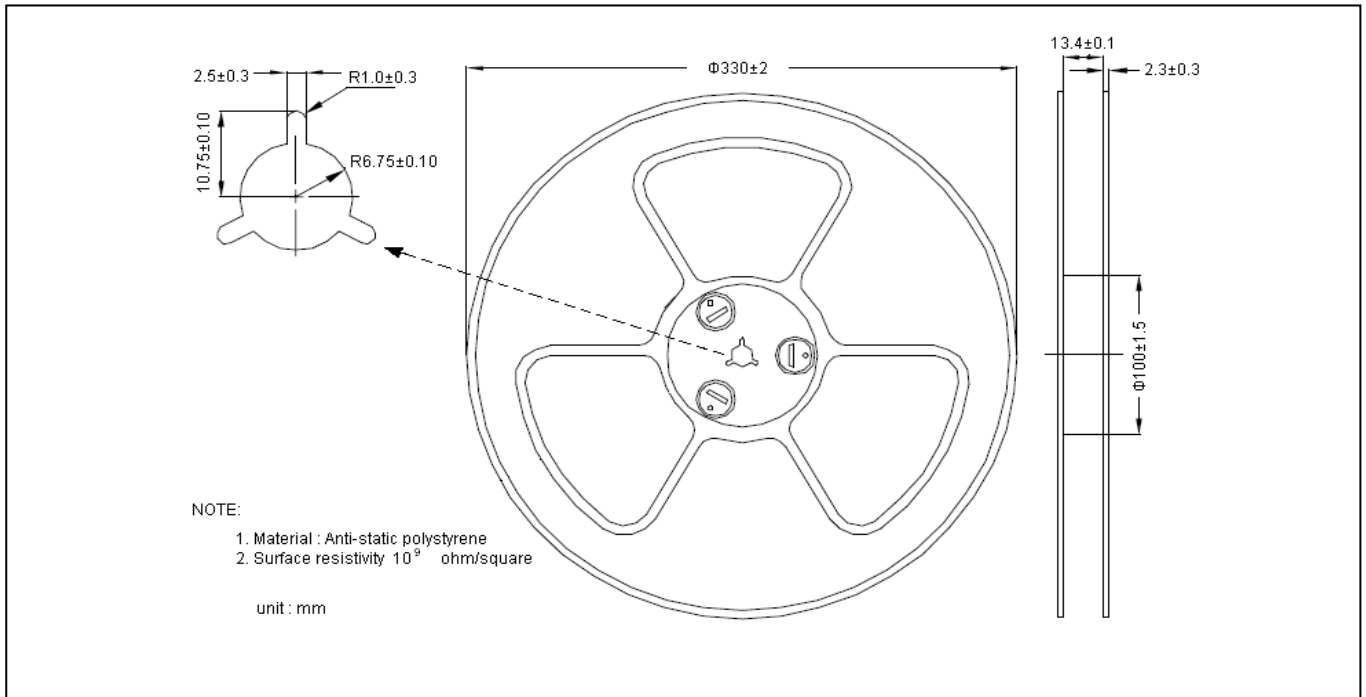


**Typical Characteristics(Cont.)**

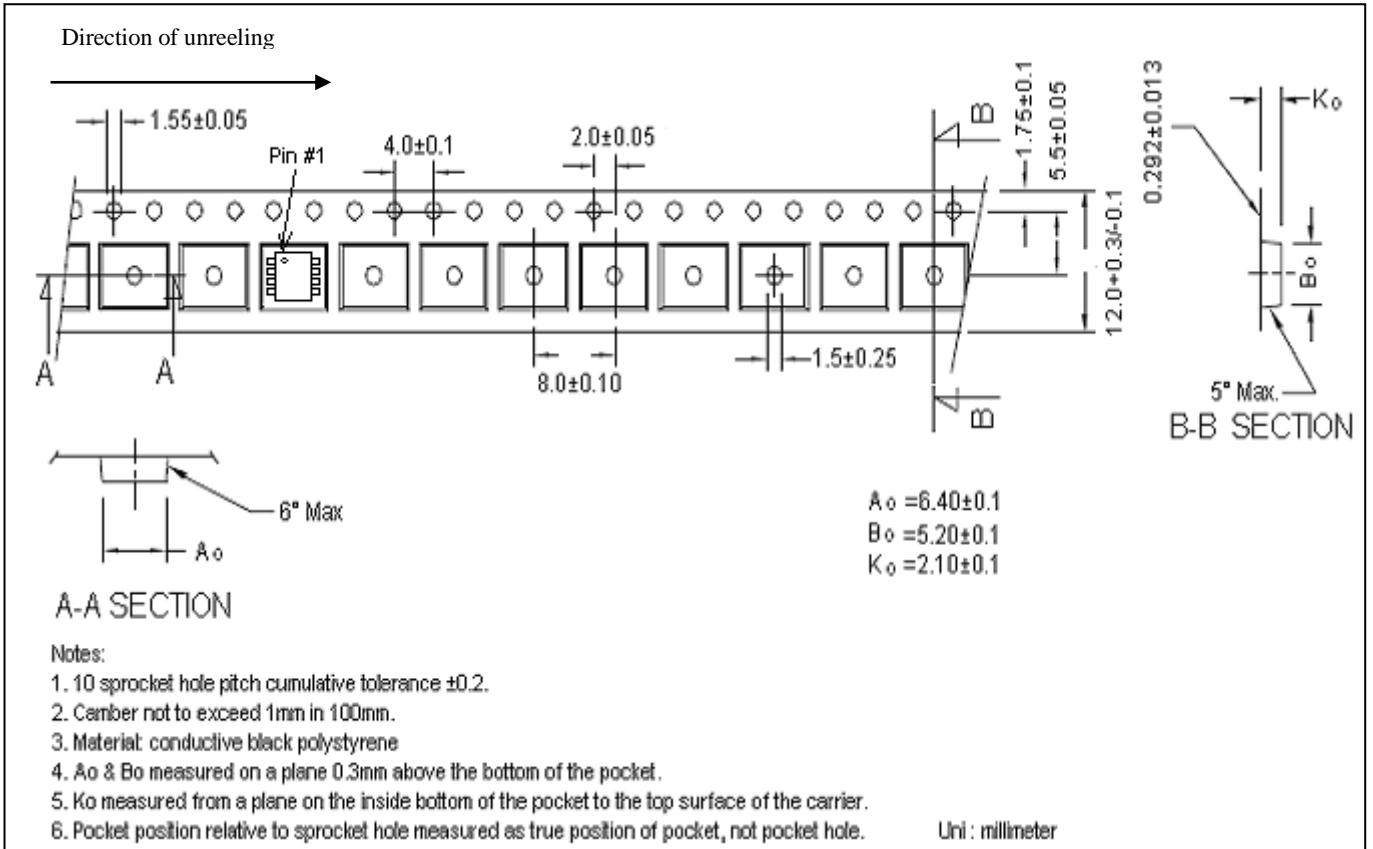
Transient Thermal Response Curves



### Reel Dimension



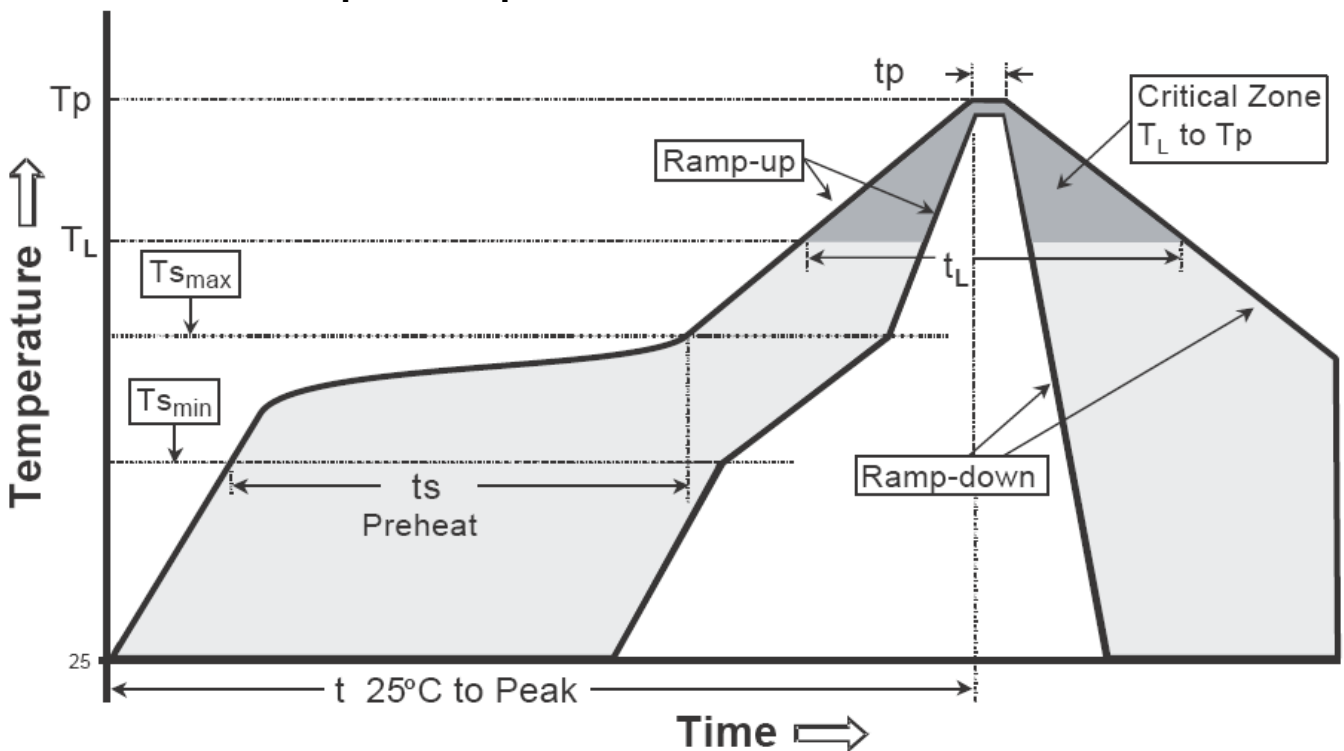
### Carrier Tape Dimension



**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**

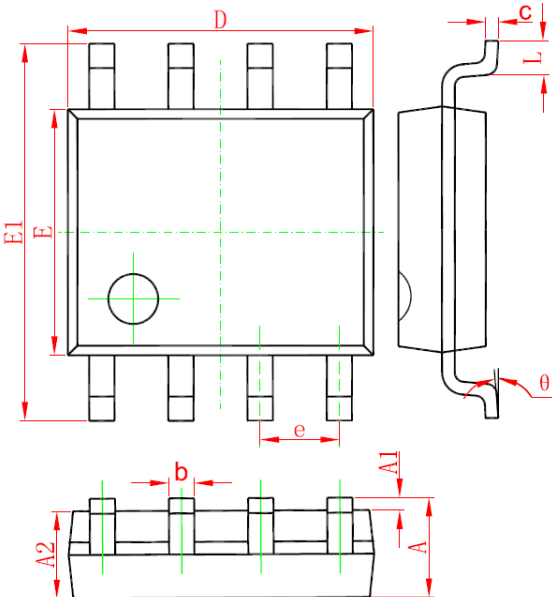


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)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

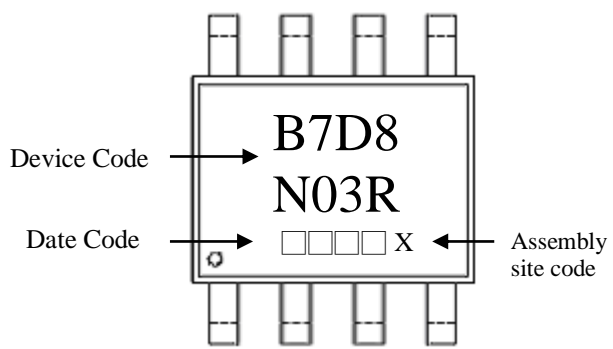
Note : All temperatures refer to topside of the package, measured on the package body surface.



**SOP-8 Dimension**



**Marking:**



Device Code → **B7D8**

Date Code → **N03R** ← Assembly site code

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

Assembly site code : blank→ site 1, G →site 2

**8-Lead SOP-8 Plastic Package**  
 CYStek Package Code: Q8

\*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	*1.270		*0.050	
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0°	8°	0°	8°
D	4.700	5.100	0.185	0.200					

**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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