

**P-Channel Enhancement Mode Power MOSFET**

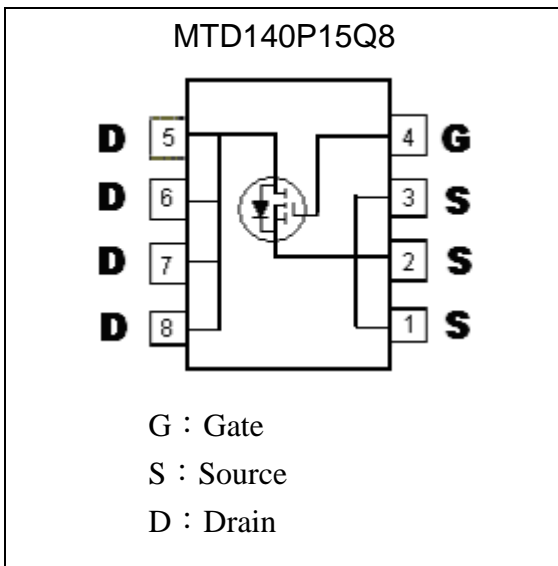
# MTD140P15Q8

BVDSS	-150V
ID@VGS=-10V, TA=25°C	-3A
RDSON@VGS=-10V, ID=-3A	133mΩ (typ)
RDSON@VGS=-4.5V, ID=-3A	152mΩ (typ)

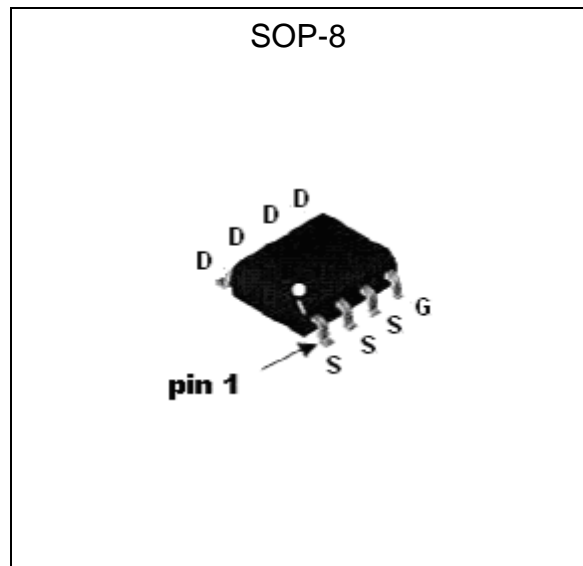
**Features**

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free and Halogen-free package

**Equivalent Circuit**

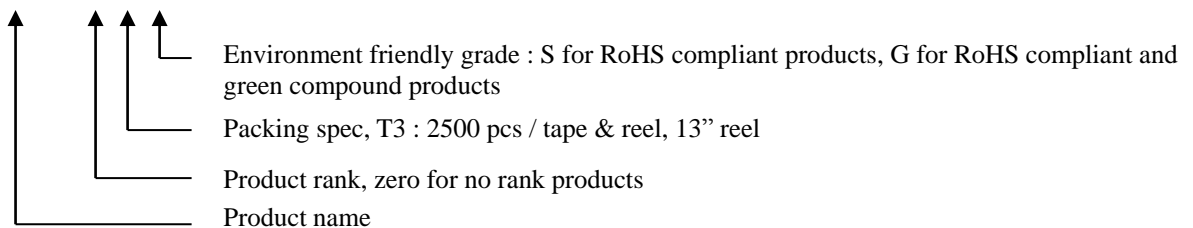


**Outline**



**Ordering Information**

Device	Package	Shipping
MTD140P15Q8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel





**Absolute Maximum Ratings** ( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

Parameter	Symbol	Limits	Unit	
Drain-Source Breakdown Voltage	$BV_{DSS}$	-150	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current @ $T_A=25^{\circ}\text{C}$ , $V_{GS}=-10\text{V}$	$I_D$	-3	A	
Continuous Drain Current @ $T_A=70^{\circ}\text{C}$ , $V_{GS}=-10\text{V}$		-2.4		
Pulsed Drain Current (Note 1)	$I_{DM}$	-12		
Single Pulse Avalanche Current	$I_{AS}$	-3		
Single Pulse Avalanche Energy @ $L=30\text{mH}$ , $I_{AS}=-3\text{A}$ , $V_{DD}=-50\text{V}$	$E_{AS}$	135	mJ	
Power Dissipation (Note 2)	$P_D$	$T_A=25^{\circ}\text{C}$	3.1	W
		$T_A=70^{\circ}\text{C}$	2	
Operating Junction and Storage Temperature Range	$T_j ; T_{stg}$	-55~+150	$^{\circ}\text{C}$	

Note : 1.Pulse width limited by maximum junction temperature.  
 2.Surface mounted on 1 in<sup>2</sup>copper pad of FR-4 board,  $t \leq 10\text{s}$ .

**Thermal Resistance Ratings**

Thermal Resistance	Symbol	Maximum	Unit
Junction-to-Case, max	$R_{\theta JC}$	3	$^{\circ}\text{C} / \text{W}$
Junction-to-Ambient, max (Note)	$R_{\theta JA}$	40	

Note : W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper,  $t \leq 10\text{s}$ ;  $125^{\circ}\text{C}/\text{W}$  when mounted on minimum copper pad.

**Electrical Characteristics** ( $T_c=25^{\circ}\text{C}$ , unless otherwise noted)

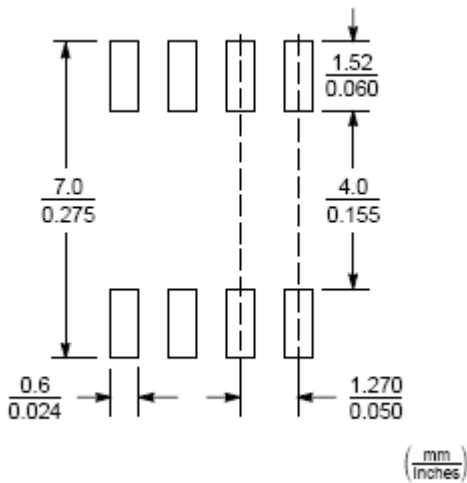
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
$BV_{DSS}$	-150	-	-	V	$V_{GS}=0\text{V}$ , $I_D=-250\mu\text{A}$
$V_{GS(th)}$	-1.5	-	-2.5		$V_{DS}=V_{GS}$ , $I_D=-250\mu\text{A}$
$I_{GSS}$	-	-	$\pm 100$	nA	$V_{GS}=\pm 20\text{V}$ , $V_{DS}=0\text{V}$
$I_{DSS}$	-	-	-1	$\mu\text{A}$	$V_{DS}=-120\text{V}$ , $V_{GS}=0\text{V}$
$I_{DSS}$	-	-	-5		$V_{DS}=-120\text{V}$ , $V_{GS}=0\text{V}$ , $T_j=55^{\circ}\text{C}$
$R_{DS(ON)}$ (Note 1)	-	133	175	m $\Omega$	$I_D=-3\text{A}$ , $V_{GS}=-10\text{V}$
	-	152	200		$I_D=-3\text{A}$ , $V_{GS}=-4.5\text{V}$
$G_{FS}$ (Note 1)	-	11	-	S	$V_{DS}=-5\text{V}$ , $I_D=-3\text{A}$
<b>Dynamic</b>					
$C_{iss}$	-	1875	-	pF	$V_{DS}=-30\text{V}$ , $V_{GS}=0\text{V}$ , $f=1\text{MHz}$
$C_{oss}$	-	119	-		
$C_{rss}$	-	65	-		
$t_d(ON)$ (Note 1&2)	-	17.2	-	ns	$V_{DS}=-75\text{V}$ , $I_D=-1.3\text{A}$ , $V_{GS}=-10\text{V}$ , $R_G=6.5\Omega$
$t_r$ (Note 1&2)	-	19.4	-		
$t_d(OFF)$ (Note 1&2)	-	63.4	-		
$t_f$ (Note 1&2)	-	24.6	-		
$Q_g$ (Note 1&2)	-	36.3	-	nC	$V_{DS}=-75\text{V}$ , $I_D=-1.3\text{A}$ , $V_{GS}=-10\text{V}$
$Q_{gs}$ (Note 1&2)	-	6.4	-		
$Q_{gd}$ (Note 1&2)	-	8	-		

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Source-Drain Diode</b>					
I <sub>S</sub>	-	-	-3	A	
I <sub>SM</sub> (Note 3)	-	-	-12		
V <sub>SD</sub> (Note 1)	-	-0.76	-1.2	V	I <sub>S</sub> =-3A, V <sub>GS</sub> =0V
trr	-	32	-	ns	I <sub>F</sub> =-1.3A, dI <sub>F</sub> /dt=100A/μs
Qrr	-	44	-	nC	

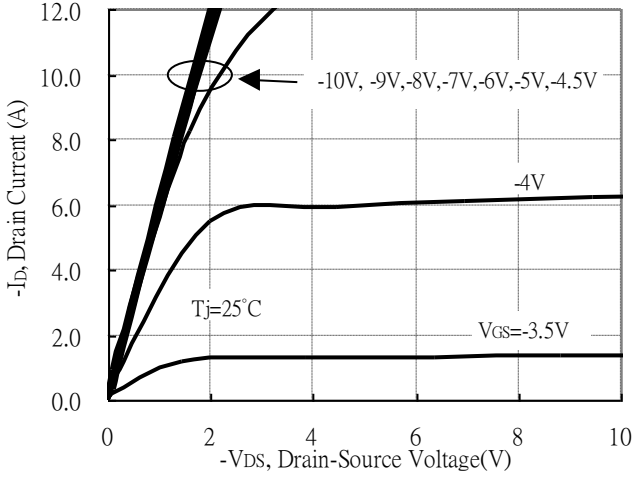
Note : 1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%  
 2.Independent of operating temperature  
 3.Pulse width limited by maximum junction temperature

**Recommended Soldering Footprint**

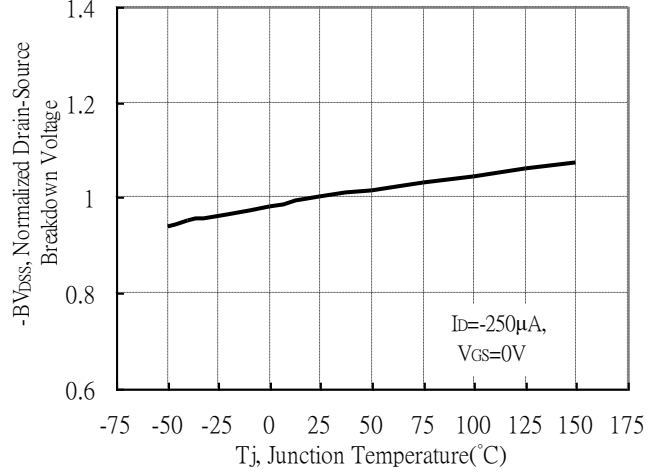


**Typical Characteristics**

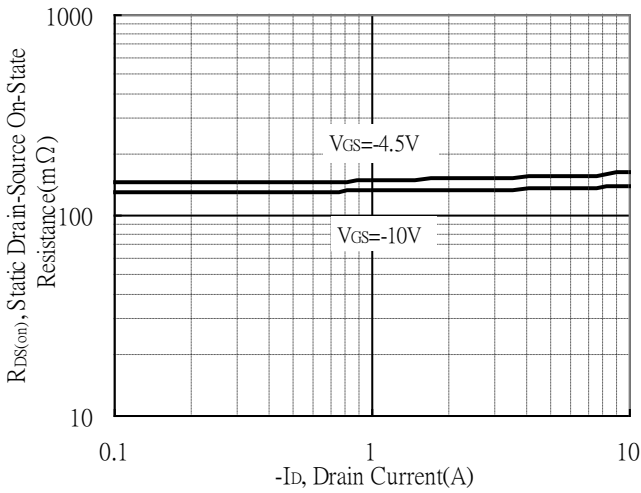
Typical Output Characteristics



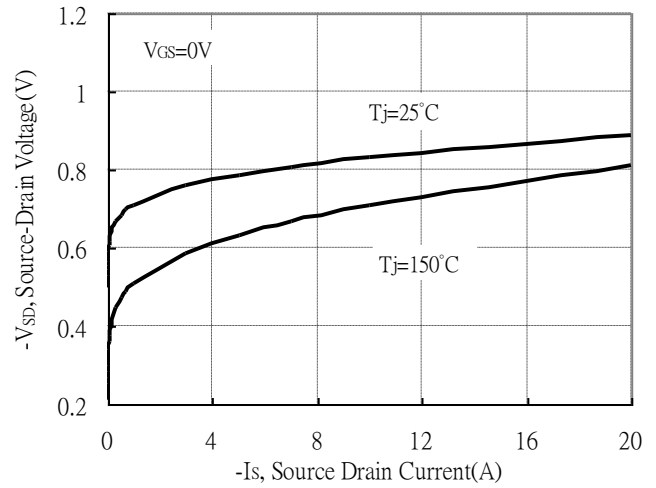
Normalized Brekdown Voltage vs Ambient Temperature



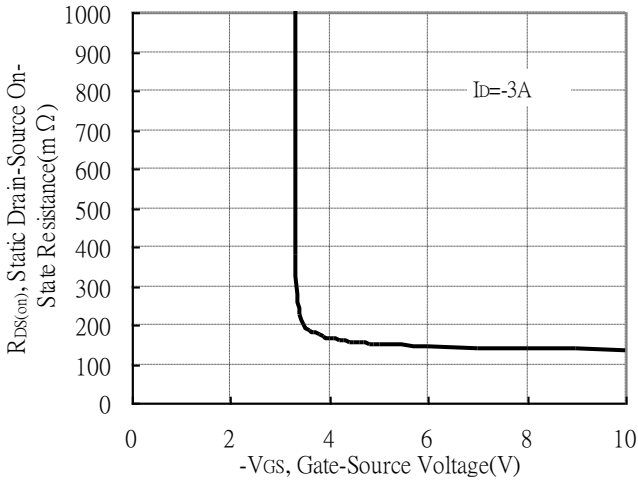
Static Drain-Source On-State resistance vs Drain Current



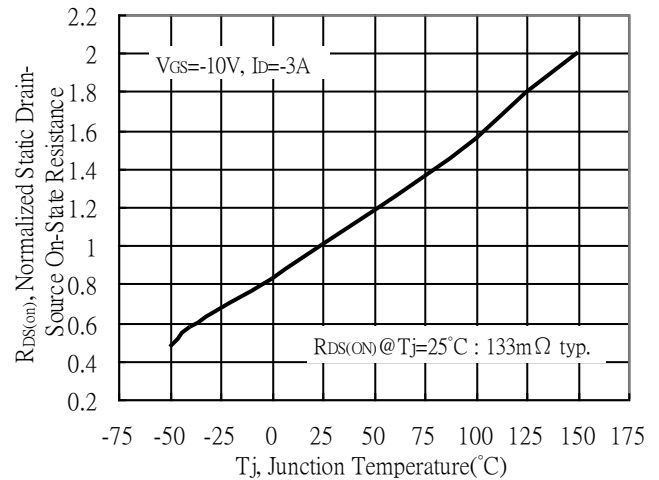
Source Drain Current vs Source-Drain Voltage



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

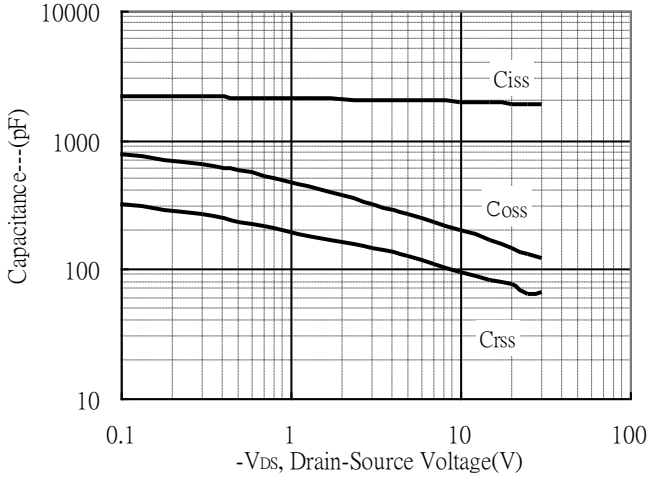


Normalized Drain-Source On-State Resistance vs Junction Temperature

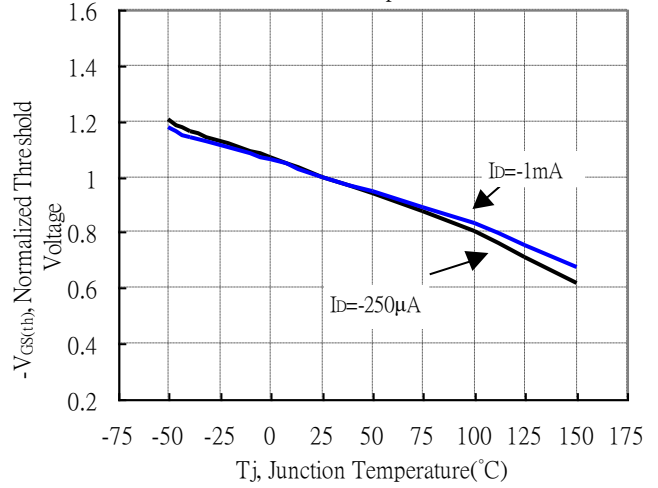


**Typical Characteristics(Cont.)**

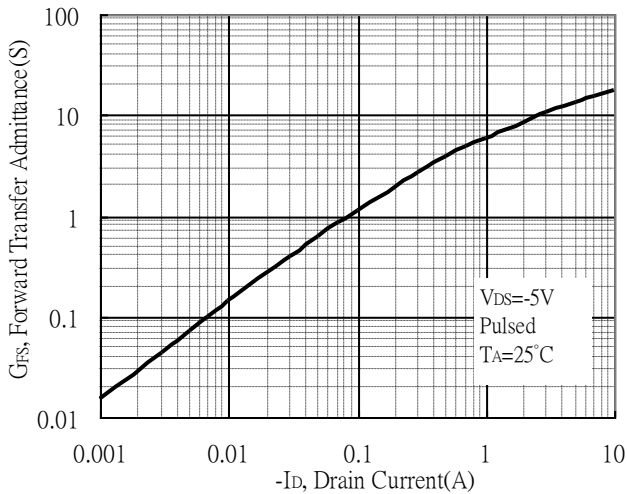
Capacitance vs Drain-to-Source Voltage



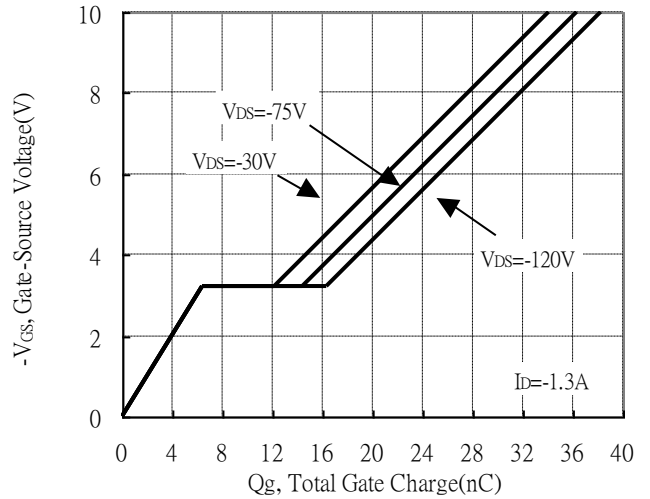
Normalized Threshold Voltage vs Junction Temperature



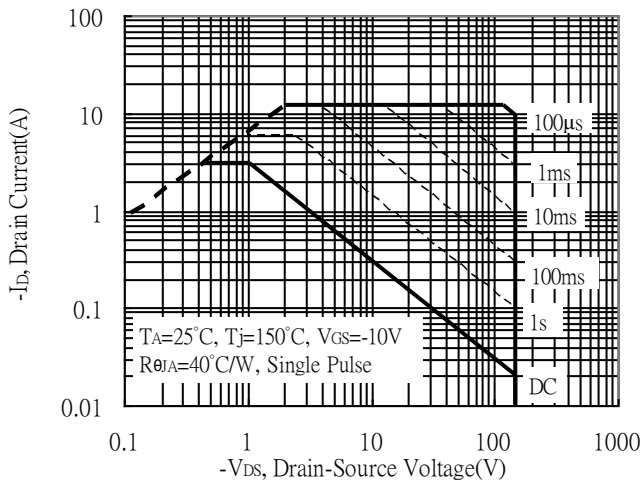
Forward Transfer Admittance vs Drain Current



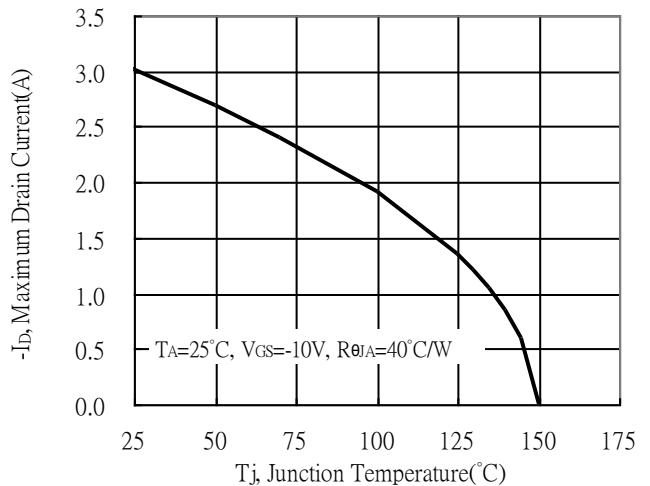
Gate Charge Characteristics



Maximum Safe Operating Area

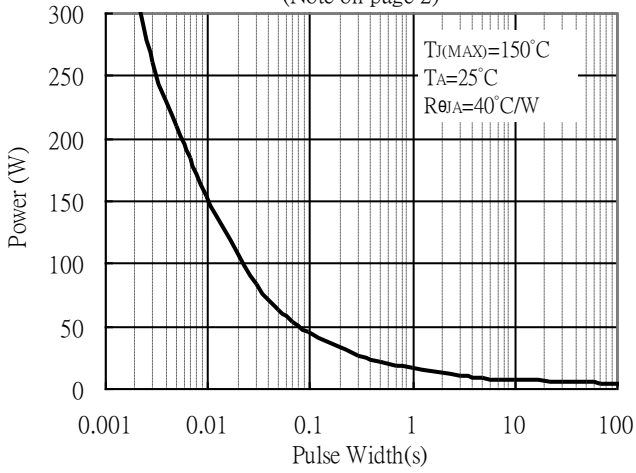


Maximum Drain Current vs Junction Temperature

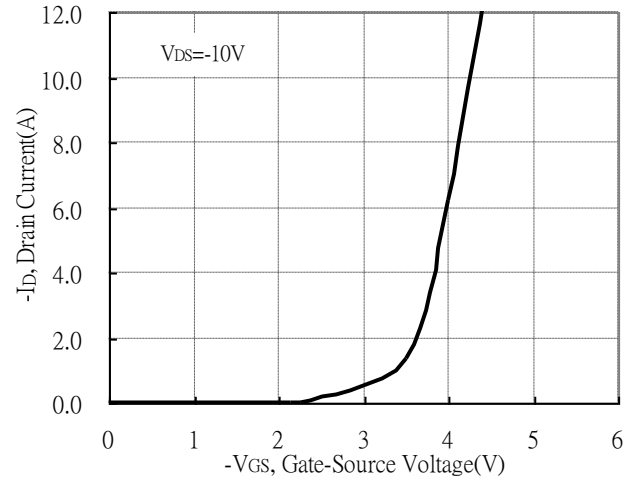


**Typical Characteristics(Cont.)**

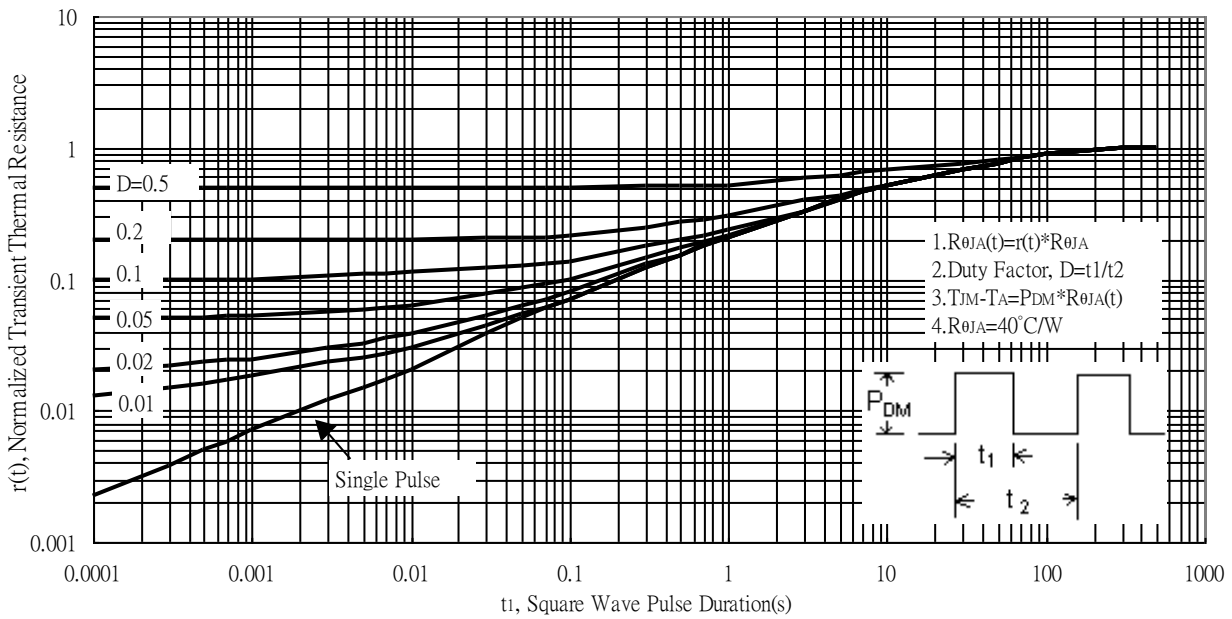
Single Pulse Power Rating, Junction to Ambient  
 (Note on page 2)



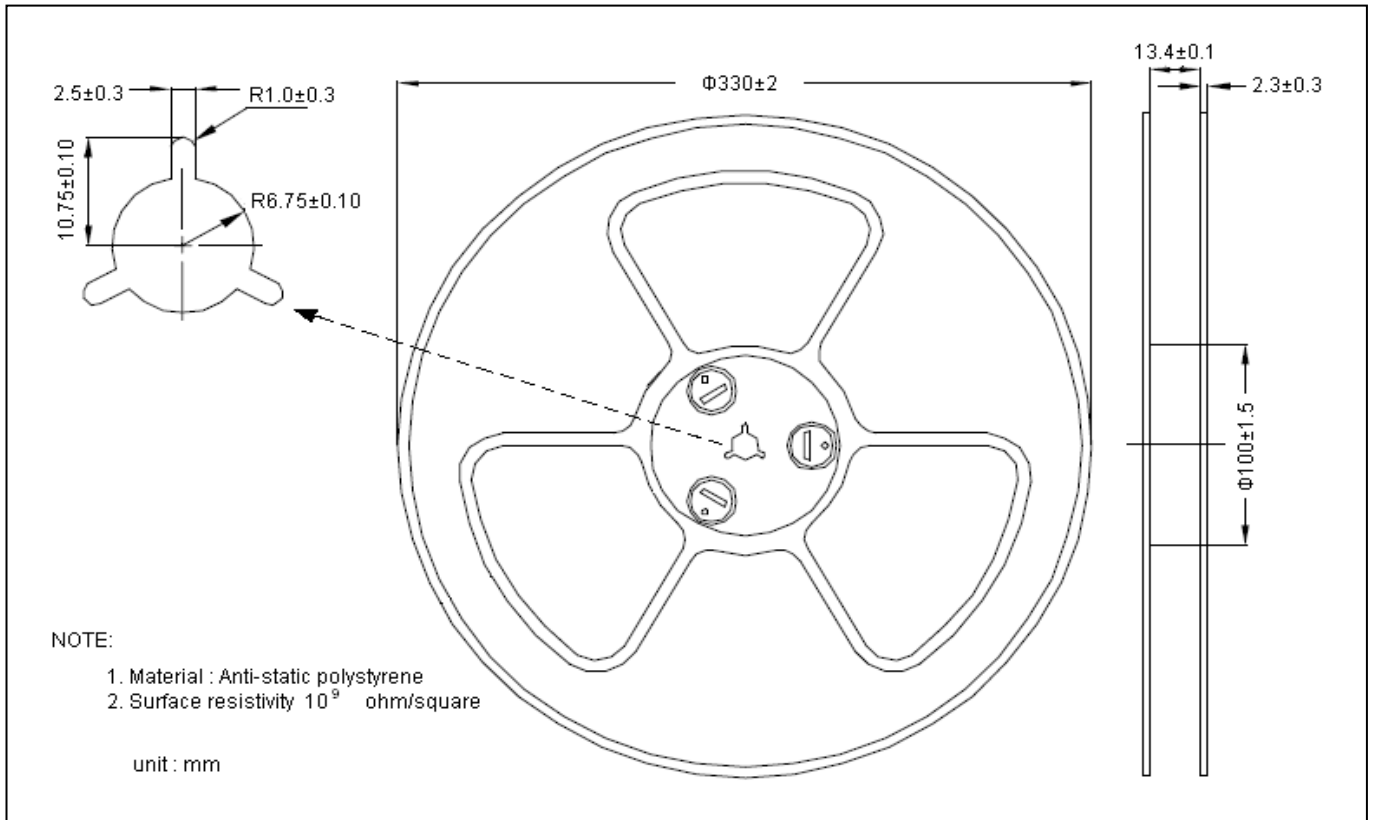
Typical Transfer Characteristics



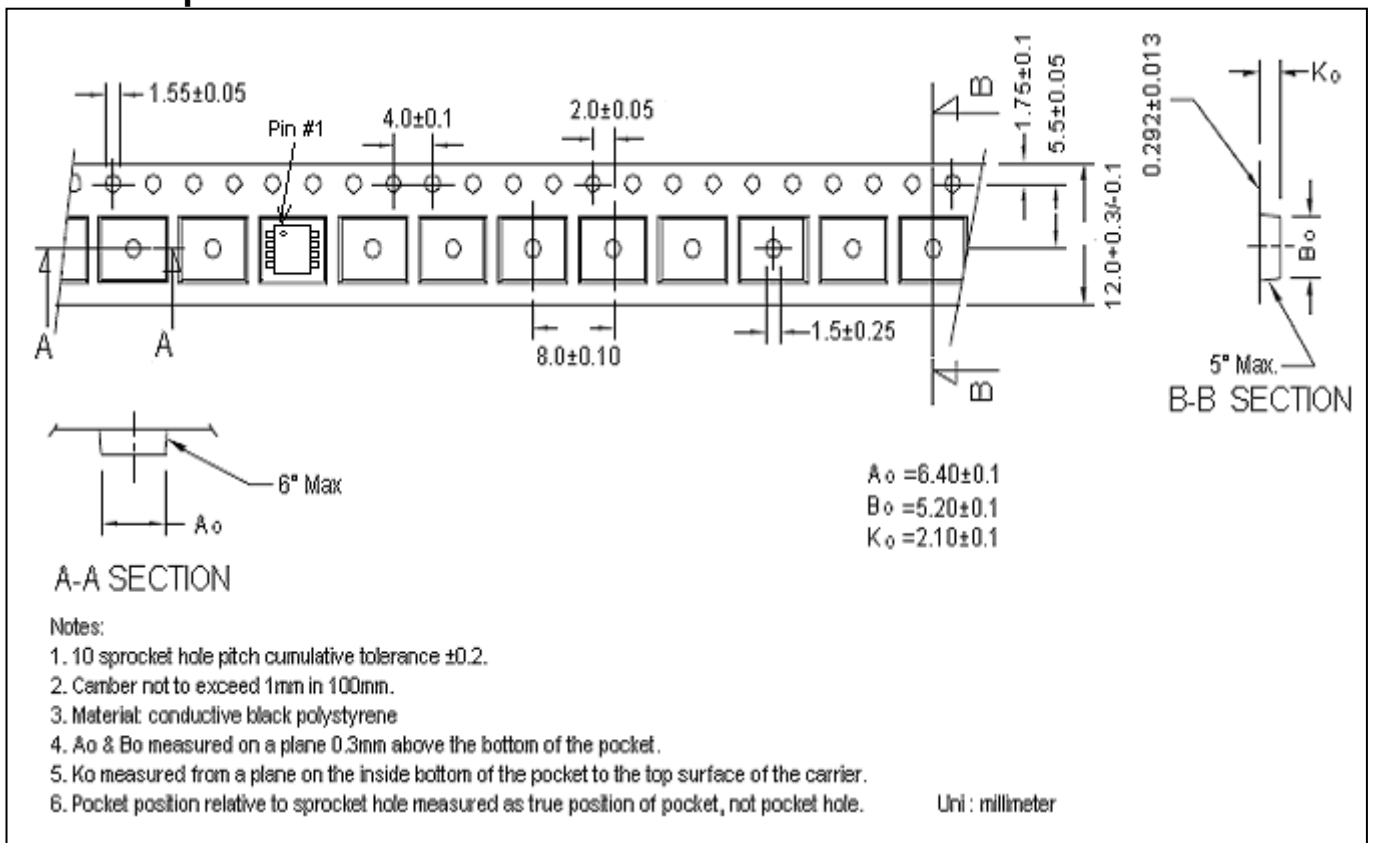
Transient Thermal Response Curves



**Reel Dimension**



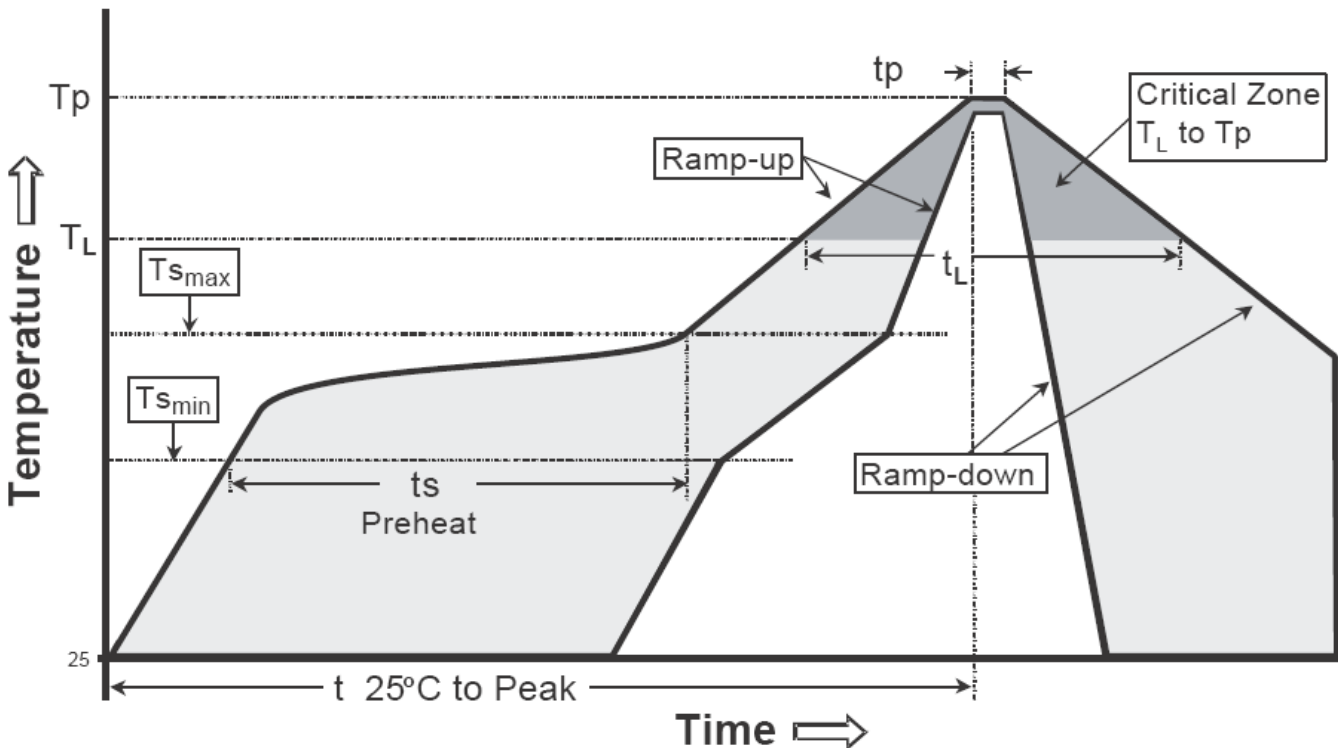
**Carrier Tape Dimension**



**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**

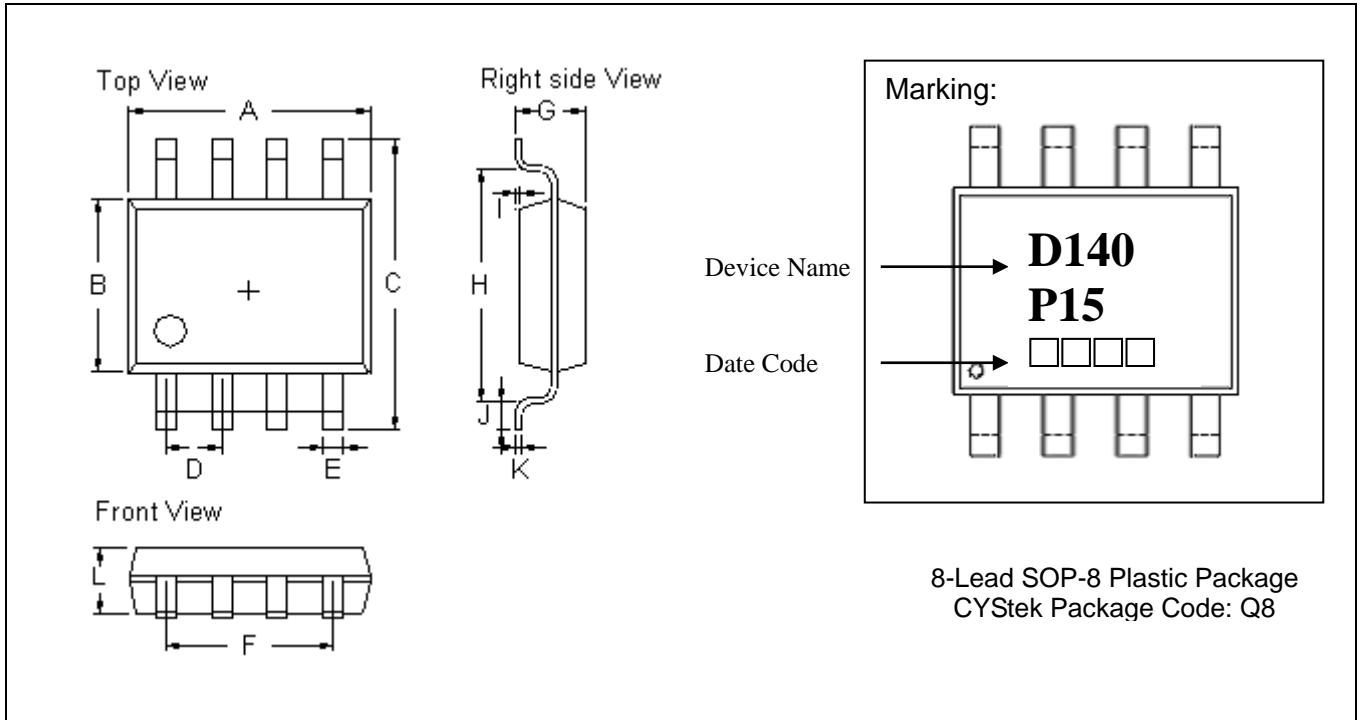


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	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.



**SOP-8 Dimension**



\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1850	0.2007	4.70	5.10	G	0.0531	0.0689	1.35	1.75
B	0.1496	0.1575	3.80	4.00	H	0.1889	0.2007	4.80	5.10
C	0.2283	0.2441	5.80	6.20	I	0.0019	0.0098	0.05	0.25
D	0.0500*		1.27 *		J	0.0157	0.0500	0.40	1.27
E	0.0130	0.0201	0.33	0.51	K	0.0067	0.0098	0.17	0.25
F	0.1472	0.1527	3.74	3.88	L	0.0531	0.0610	1.35	1.55

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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