Dual P-Channel Enhancement Mode Power MOSFET

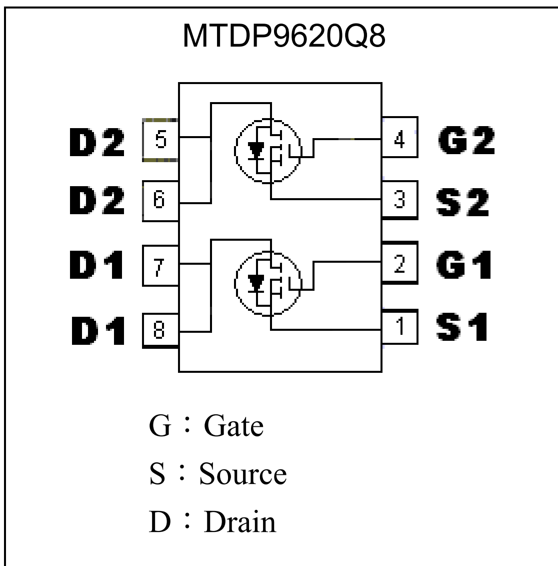
MTDP9620Q8

BVDSS	-20V
ID@VGS=-4.5V, TA=25˚C	-5.2A
ID@VGS=-4.5V, TC=25˚C	-8.8A
RDSON@VGS=-4.5V, ID=-6.5A	16.4mΩ(typ)
RDSON@VGS=-2.5V, ID=-4.2A	19.8mΩ(typ)
RDSON@VGS=-1.8V, ID=-3.5A	24.7mΩ(typ)

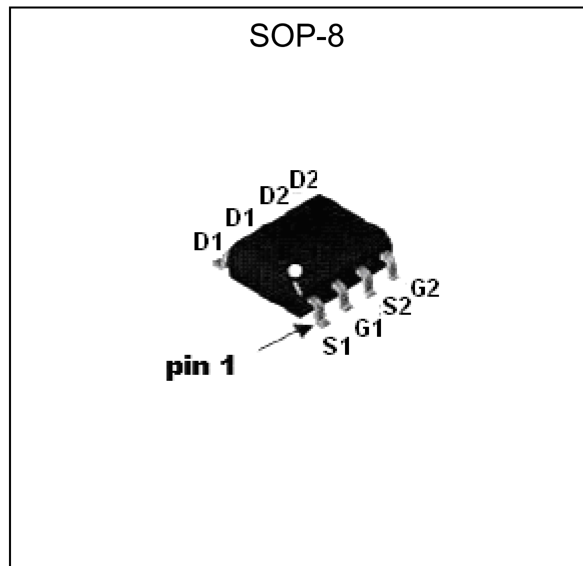
Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free lead plating and halogen-free package

Equivalent Circuit

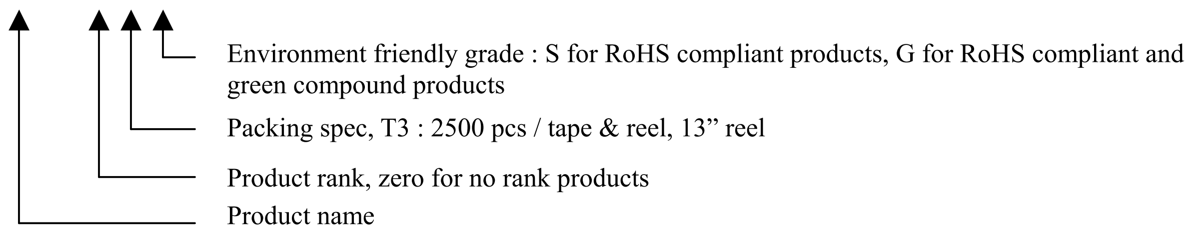


Outline



Ordering Information

Device	Package	Shipping
MTDP9620Q8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel



Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	10s	Steady State	Unit
Drain-Source Voltage		V_{DS}	-20		V
Gate-Source Voltage		V_{GS}	±12		V
Continuous Drain Current @ T_C=25°C, V_{GS}=-4.5V (Note1)		I_D	-8.8		A
Continuous Drain Current @ T_C=100°C, V_{GS}=-4.5V (Note1)		I_D	-5.6		A
Continuous Drain Current @ T_A=25°C, V_{GS}=-4.5V (Note2)		I_{DSM}	-7.0	-5.2	A
Continuous Drain Current @ T_A=70°C, V_{GS}=-4.5V (Note2)		I_{DSM}	-5.6	-4.2	A
Pulsed Drain Current (Note3)		I_{DM}	-40 *1,2		A
Total Power Dissipation	T_C=25℃ (Note1)	P_D	3.1		W
	T_C=100℃ (Note1)	P_D	1.2		W
	T_A=25°C (Note2)	P_{DSM}	2.0	1.1	W
	T_A=70°C (Note2)	P_{DSM}	1.3	0.7	W
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+150		°C

Thermal Data

Parameter		Symbol	Typical	Maximum	Unit
Thermal Resistance, Junction-to-case		$R_{th,j-c}$	34	40	°C/W
Thermal Resistance, Junction-to-ambient (Note2)	t≤10s	$R_{th,j-a}$	58	62.5	°C/W
	Steady State	$R_{th,j-a}$	91	110	°C/W

Note : 1. The power dissipation P_D is based on $T_{J(MAX)}$=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 $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

3. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

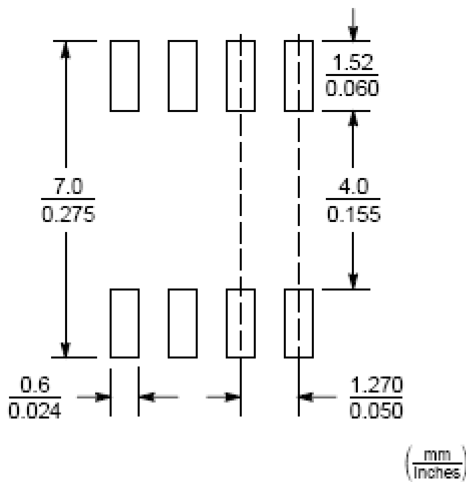
Electrical Characteristics (Tc=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-0.3	-	-0.8	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-20V, V_{GS}=0V
I_{DSS}	-	-	-5	μA	V_{DS}=-20V, V_{GS}=0, Tj=55°C
$R_{DS(ON)}$ (Note 1)	-	16.4	28	mΩ	I_D=-6.5A, V_{GS}=-4.5V
	-	19.8	35	mΩ	I_D=-4.2A, V_{GS}=-2.5V
	-	24.7	45	mΩ	I_D=-3.5A, V_{GS}=-1.8V
G_{FS} (Note 1)	-	19.1	-	S	V_{DS}=-5V, I_D=-4.8A

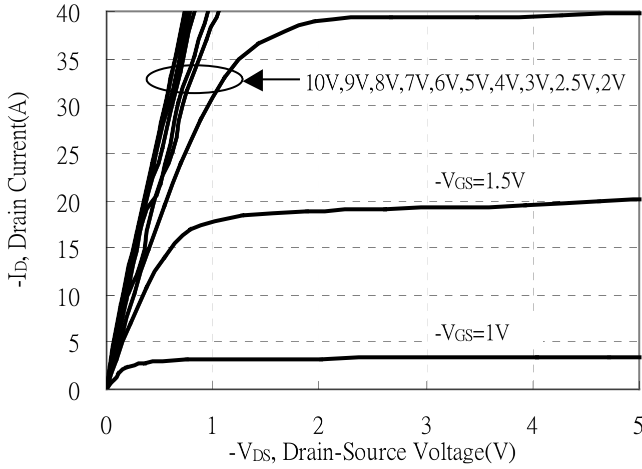
Dynamic					
Ciss	-	2100	3150	pF	V_{DS}=-10V, V_{GS}=0, f=1MHz
Coss	-	213	320		
Crss	-	166	249		
$t_{d(ON)}$ (Note 1&2)	-	6.8	10.2	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V, R_G=6Ω
t_r (Note 1&2)	-	26.6	40		
$t_{d(OFF)}$ (Note 1&2)	-	222.8	334		
t_f (Note 1&2)	-	115.4	173		
Qg (Note 1&2)	-	24.5	37	nC	V_{DS}=-10V, I_D=-6.5A, V_{GS}=-4.5V
Qgs (Note 1&2)	-	2.9	-		
Qgd (Note 1&2)	-	4.9	-		
Rg	-	13.5	-	Ω	f=1MHz
Source-Drain Diode					
I_S	-	-	-1.7	A	
I_{SM}(Note 3)	-	-	-10		
V_{SD}(Note 1)	-	-0.72	-1.2	V	I_S=-1.7A, V_{GS}=0V
trr	-	67.5	-	ns	I_F=-1.7A, dI_F/dt=100A/μs
Qrr	-	51.6	-	nC	

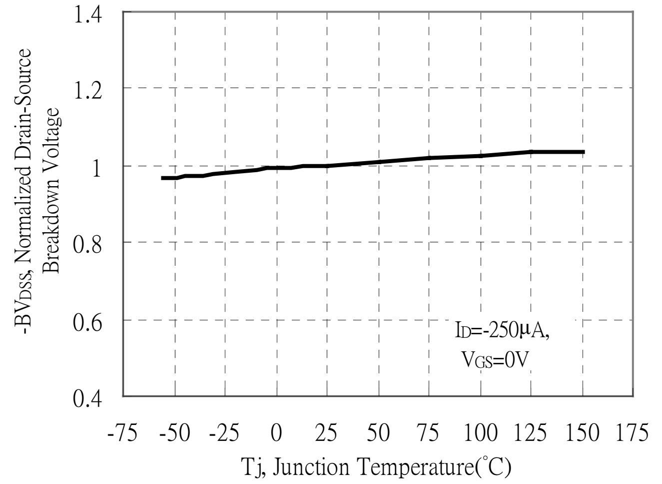
Note : 1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
2.Independent of operating temperature
3.Pulse width limited by maximum junction temperature

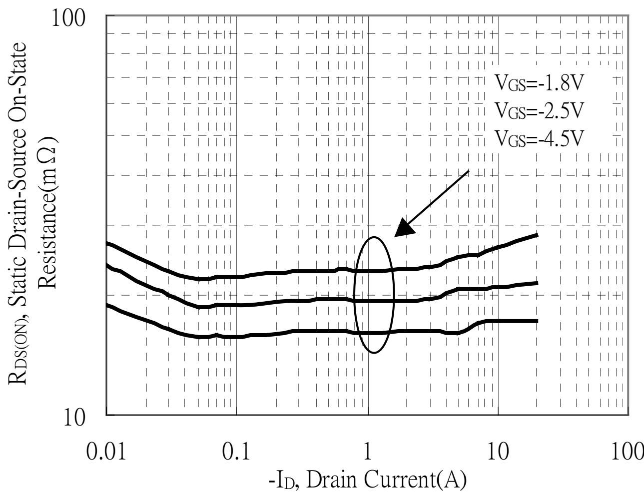
Recommended Soldering Footprint

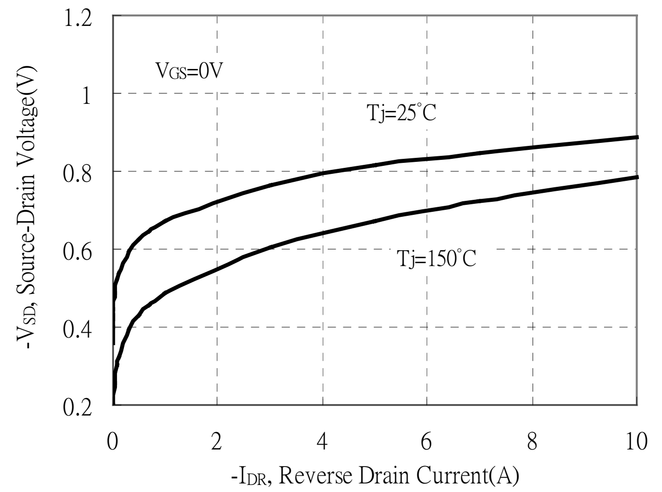


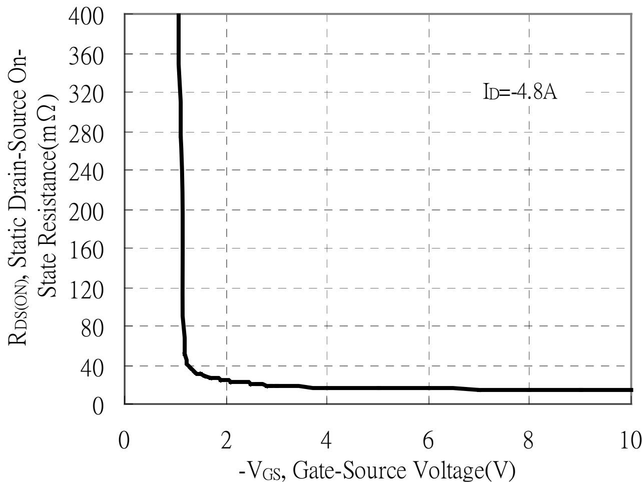
Typical Characteristics

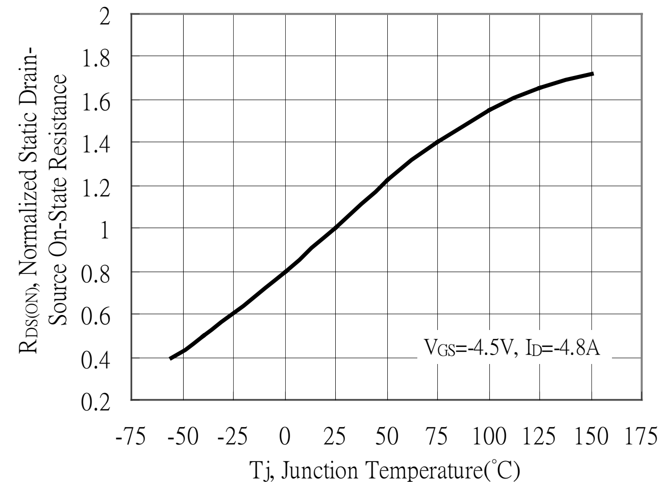




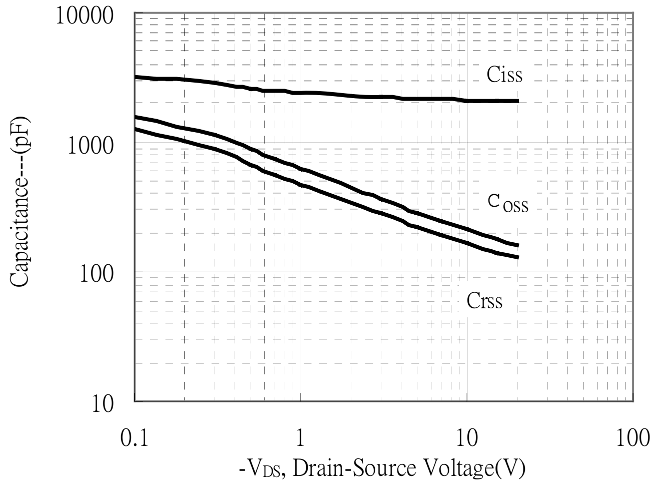


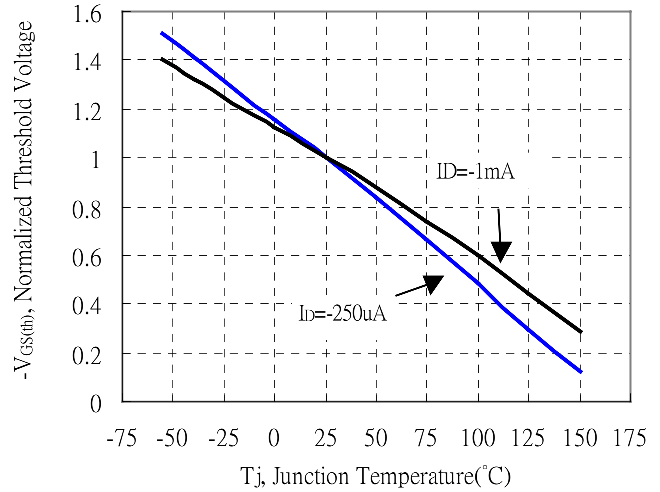


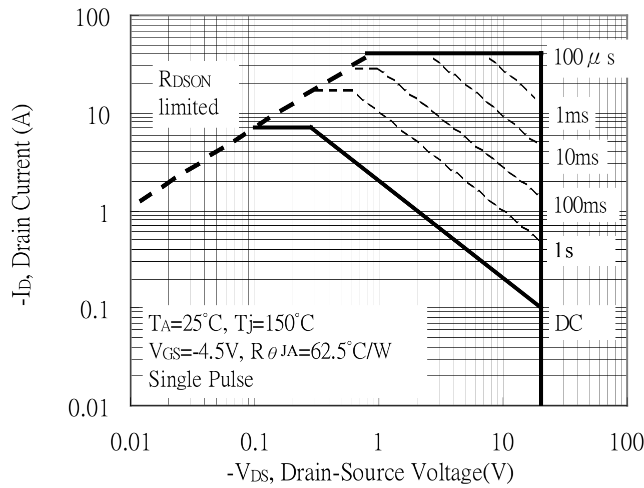


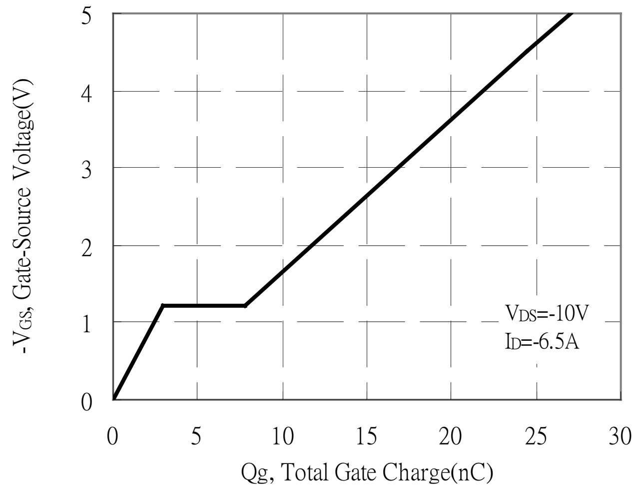


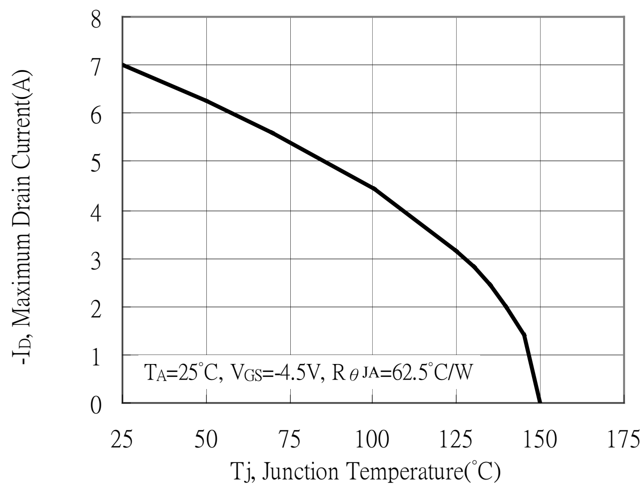
Typical Characteristics(Cont.)

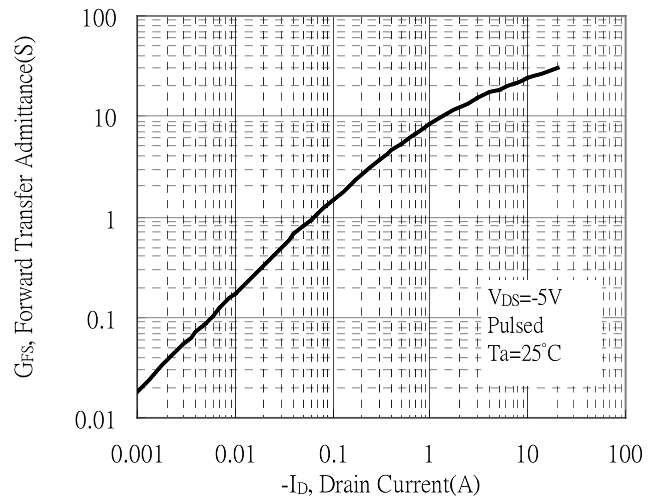




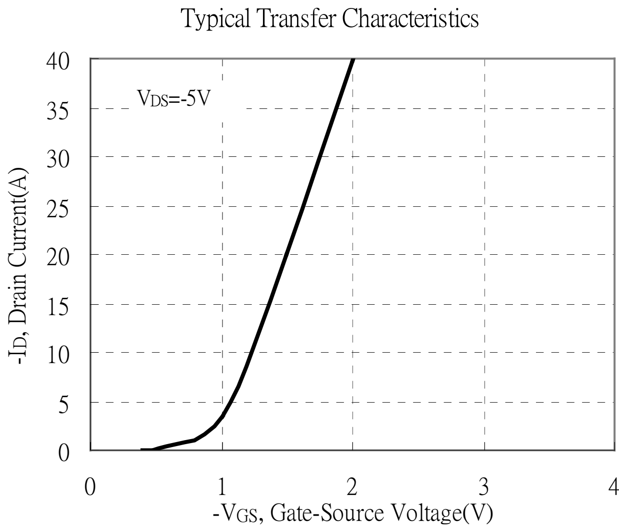


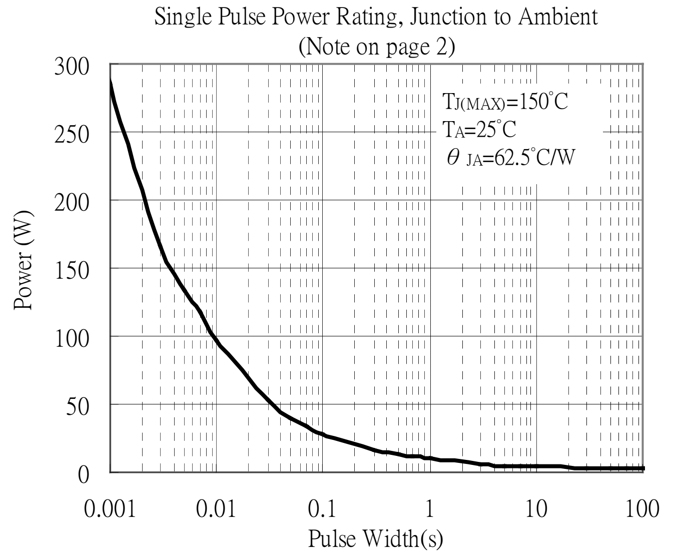


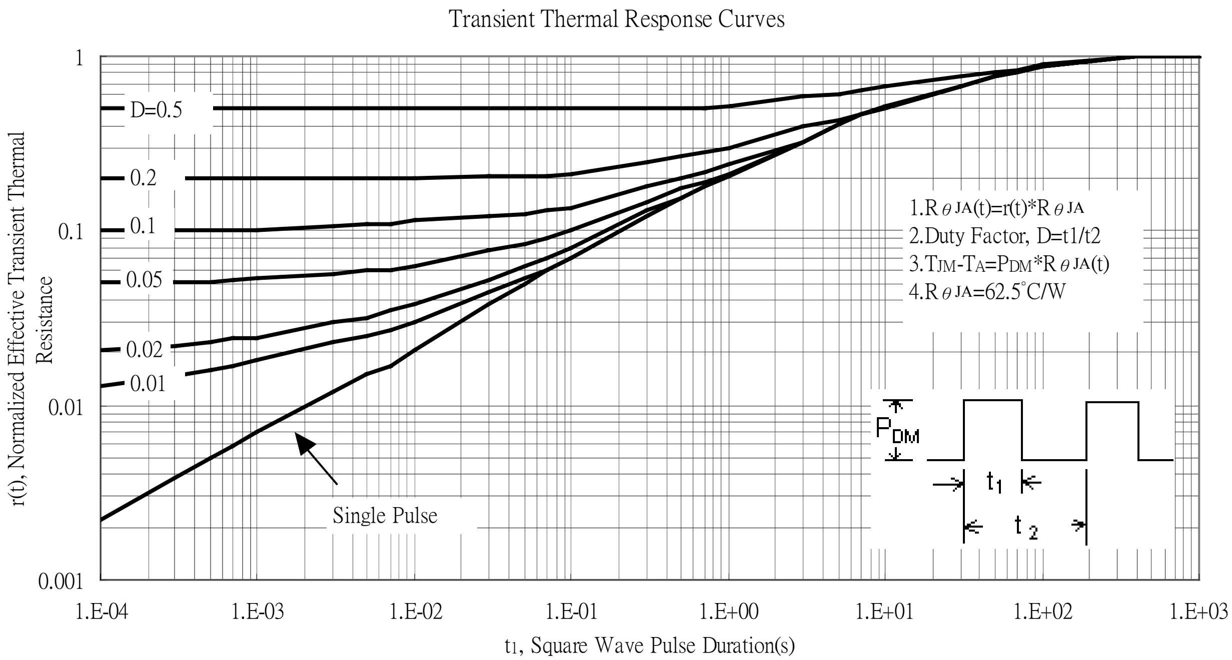




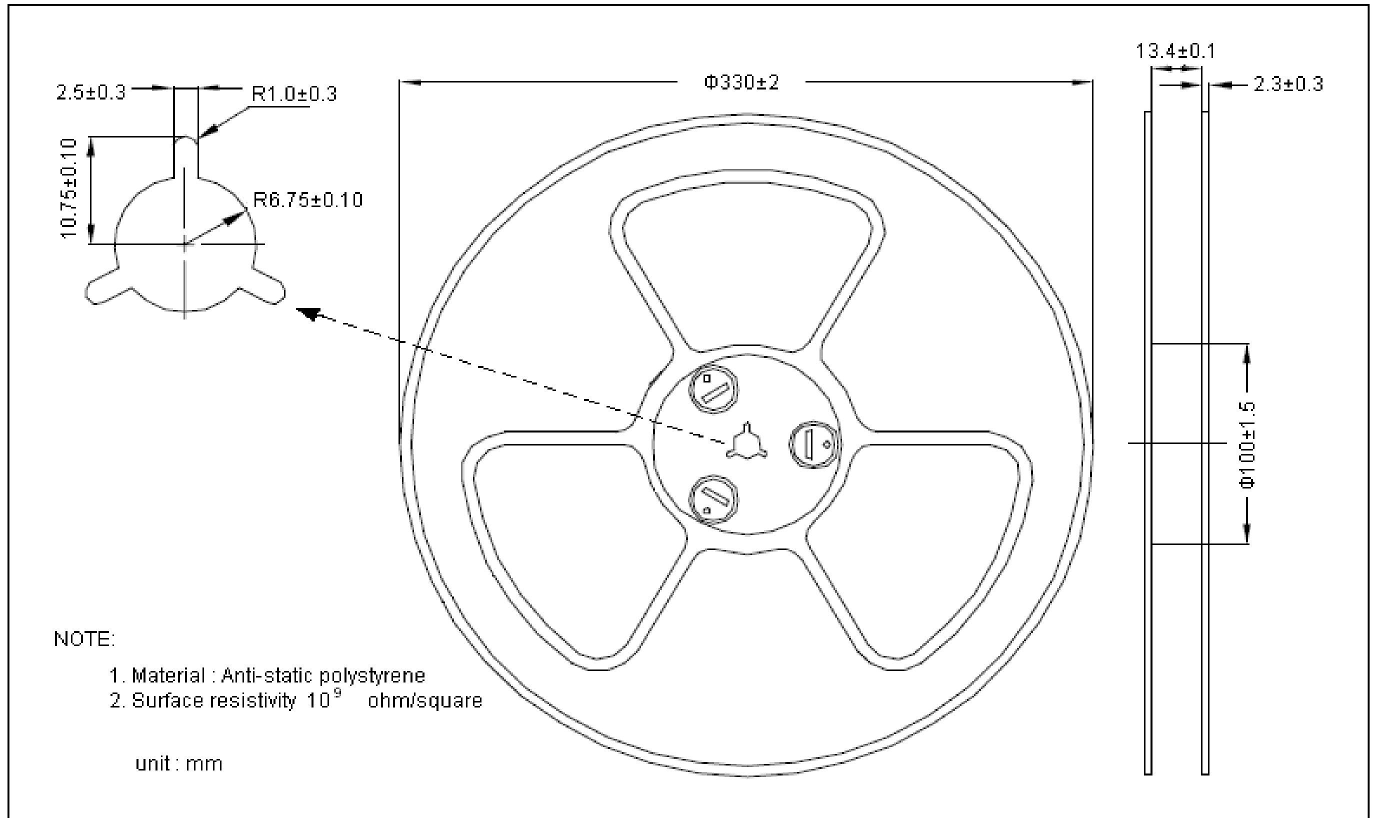
Typical Characteristics(Cont.)



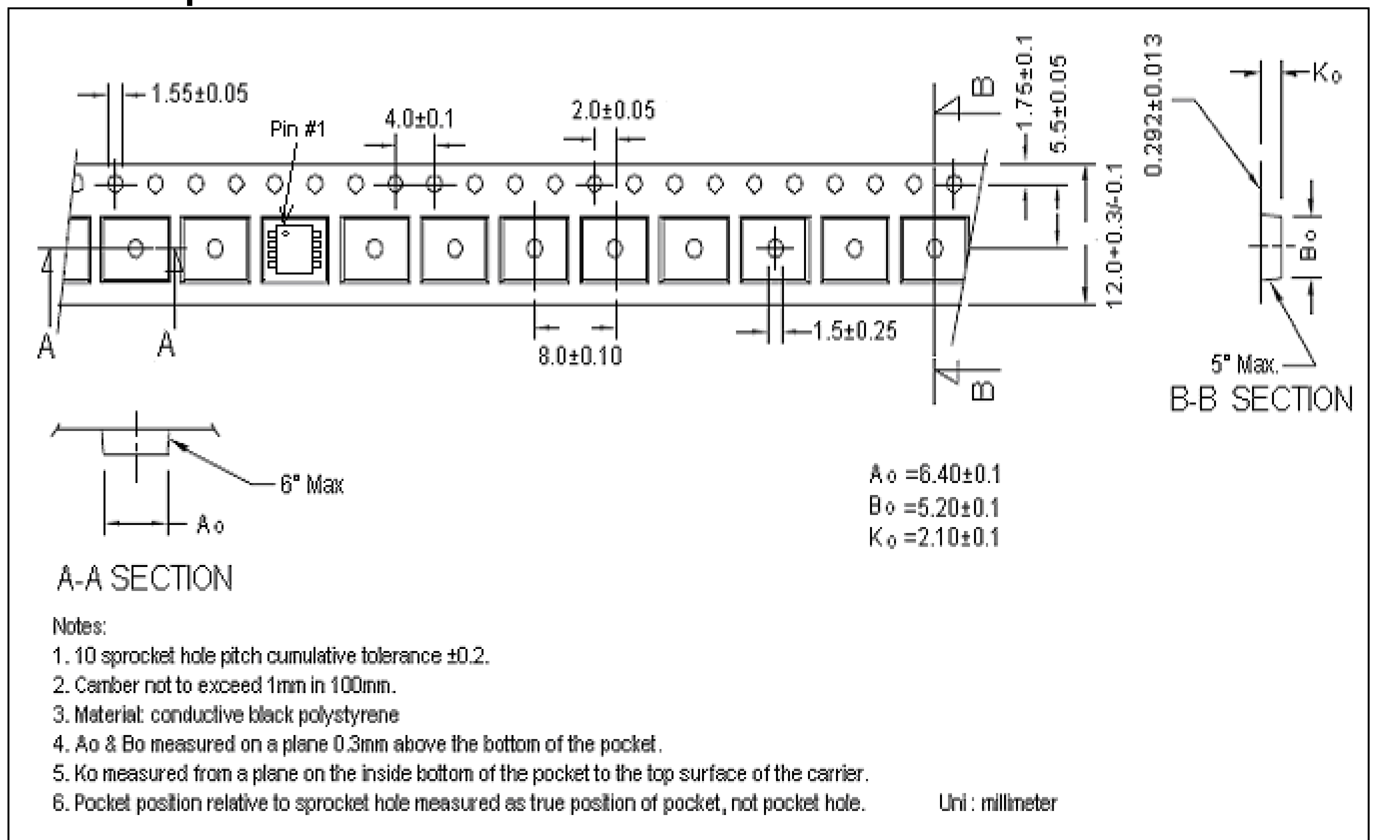




Reel Dimension



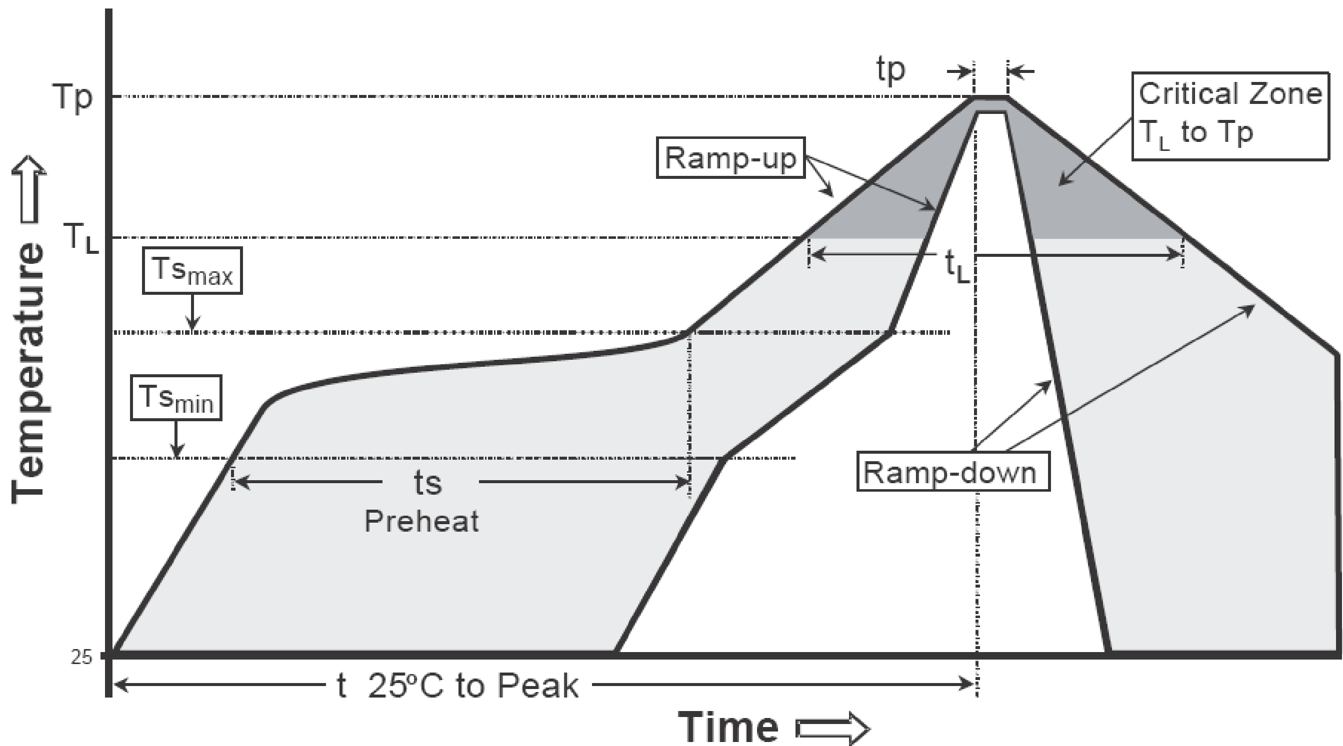
Carrier Tape Dimension



Recommended wave soldering condition

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

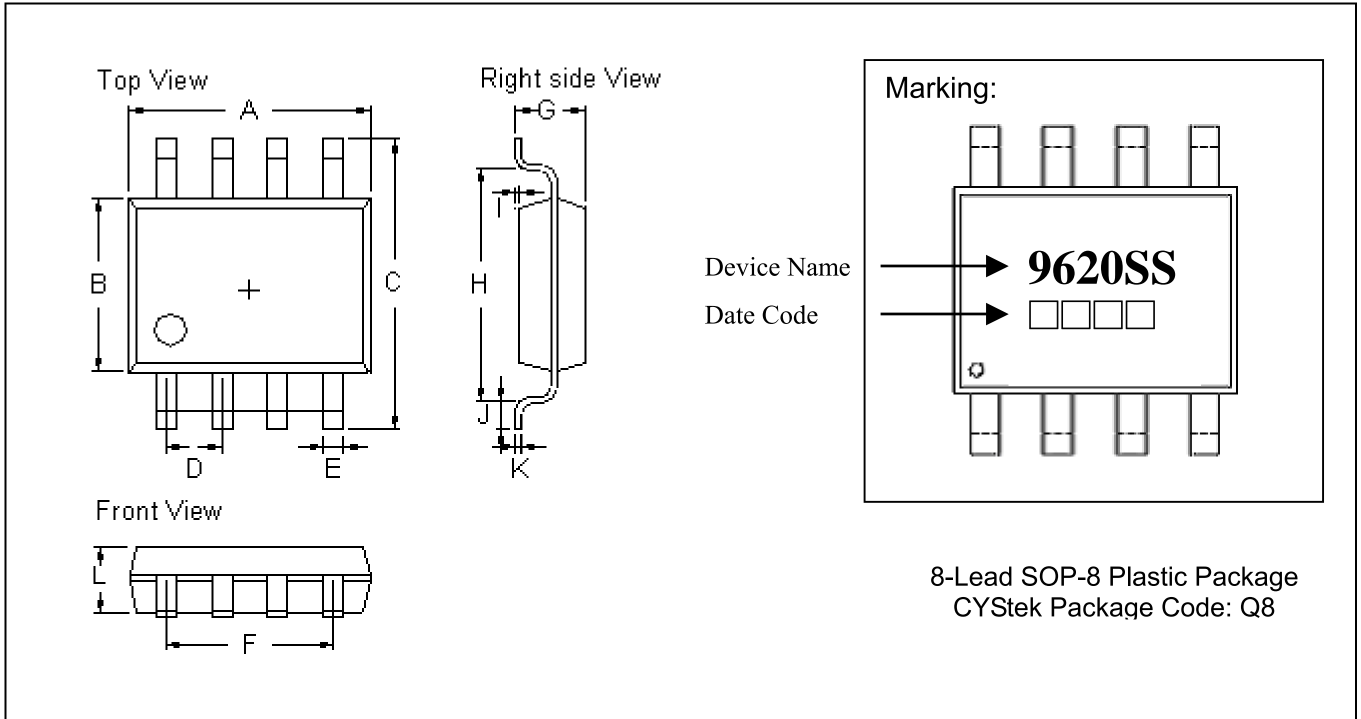
Recommended temperature profile for IR reflow



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(T_S min) −Temperature Max(T_S 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 (T_L) − Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_P)	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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