Dual N-CHANNEL ENHANCEMENT MODE POWER MOSFET

MTDN9922Q8

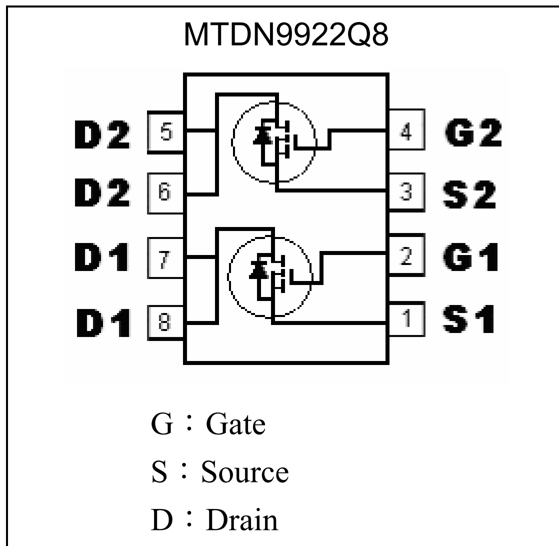
Description

The MTDN9922Q8 provides the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness.
The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

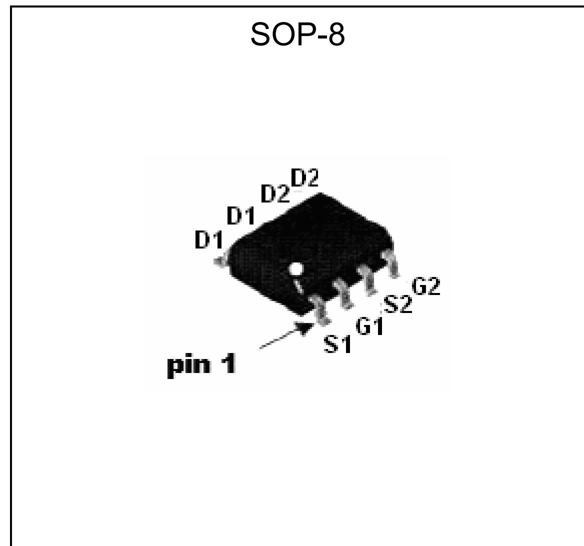
Features

- $R_{DS(ON)}$=20mΩ@V_{GS}=4.5V, I_D=4A
- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Dual N-ch MOSFET package
- Capable of 2.5V gate drive
- Pb-free lead plating package

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping	Marking
MTDN9922Q8	SOP-8 (Pb-free lead plating package)	3000 pcs / Tape & Reel	9922ESS

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current @ V_{GS}=4.5V, T_A=25 °C (Note 1)	I_D	6.8	A
Continuous Drain Current @ V_{GS}=4.5V, T_A=70 °C (Note 1)	I_D	5.4	A
Pulsed Drain Current (Note 2&3)	I_{DM}	25	A
Total Power Dissipation @ T_A=25 °C	Pd	2	W
Linear Derating Factor		0.016	W / °C
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150	°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,ja	62.5	°C/W

Note : 1. Surface mounted on 1 in² copper pad of FR-4 board; 135°C/W when mounted on minimum copper pad
2. Pulse width limited by maximum junction temperature.
3. Pulse width≤300μs, duty cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0, ID=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.05	-	V/°C	Reference to 25°C, I_D=1mA
$V_{GS(th)}$	0.5	-	1.2	V	V_{DS} = V_{GS}, I_D=250μA
G_{FS}	-	22	-	S	V_{DS}=4.5V, I_D=6A
I_{GSS}	-	-	±10	μA	V_{GS}=±12V, V_{DS}=0
I_{DSS}	-	-	10	μA	V_{DS} =20V, V_{GS} =0
	-	-	100	μA	V_{DS} =16V, V_{GS} =0, Tj=70°C
*$R_{DS(ON)}$	-	-	20	mΩ	I_D=6A, V_{GS}=4.5V
	-	-	25		I_D=4A, V_{GS}=2.5V
Dynamic					
*Qg	-	25	40	nC	V_{DS}=16V, I_D=6A, V_{GS}=4.5V
*Qgs	-	3	-		
*Qgd	-	9	-		
*$t_{d(ON)}$	-	11	-	ns	V_{DS}=15V, I_D=1A, V_{GS}=4.5V, R_G=3.3Ω, R_D=15Ω
*tr	-	12	-		
*$t_{d(OFF)}$	-	47	-		
*tf	-	23	-		
Ciss	-	1730	2770	pF	V_{DS}=20V, V_{GS}=0, f=1MHz
Coss	-	280	-		
Crss	-	240	-		
Rg	-	2.2	-	Ω	f=1.0MHz
Source-Drain Diode					
*V_{SD}	-	-	1.2	V	I_S=0.84A, V_{GS}=0V
*trr	-	24	-	ns	I_S=6A, V_{GS}=0, dI/dt=100A/μs
*Qrr	-	18	-	nC	

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

Characteristic Curves

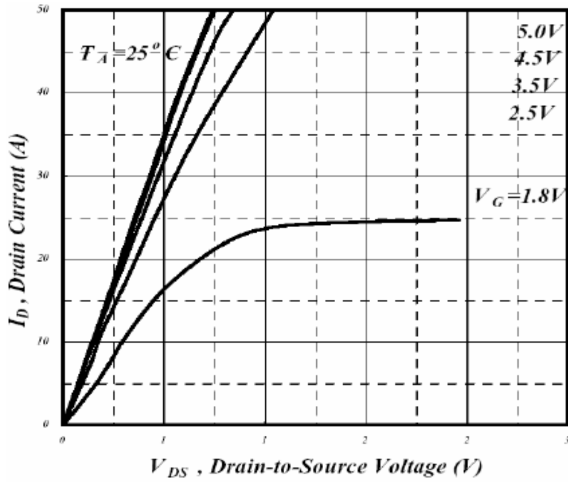


Fig 1. Typical Output Characteristics

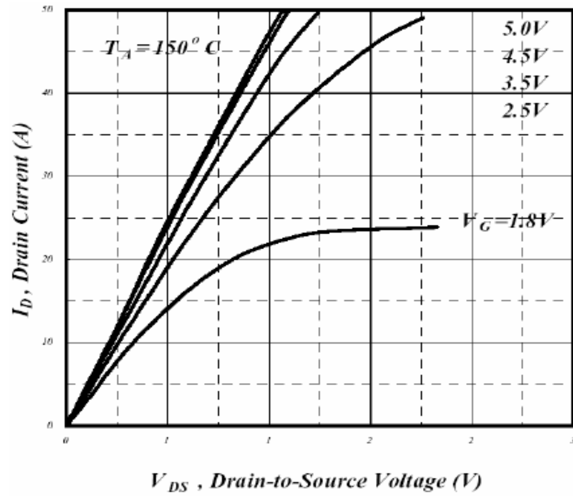


Fig 2. Typical Output Characteristics

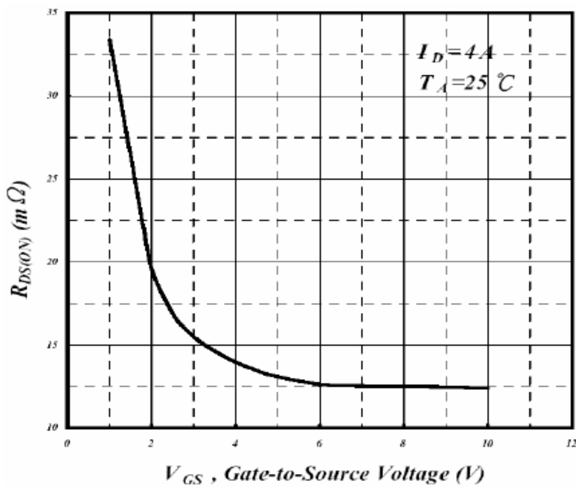


Fig 3. On-Resistance v.s. Gate Voltage

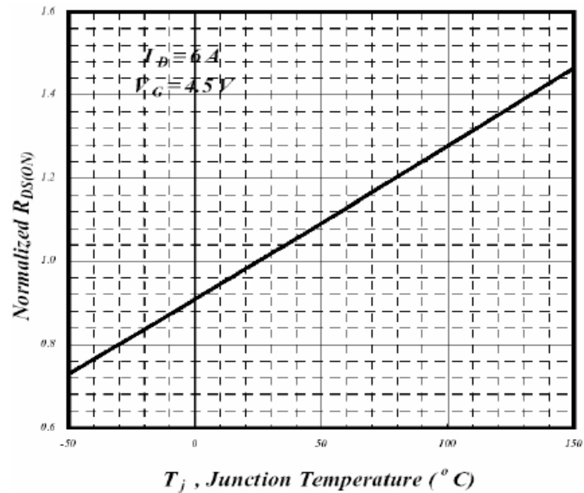


Fig 4. Normalized On-Resistance v.s. Junction Temperature

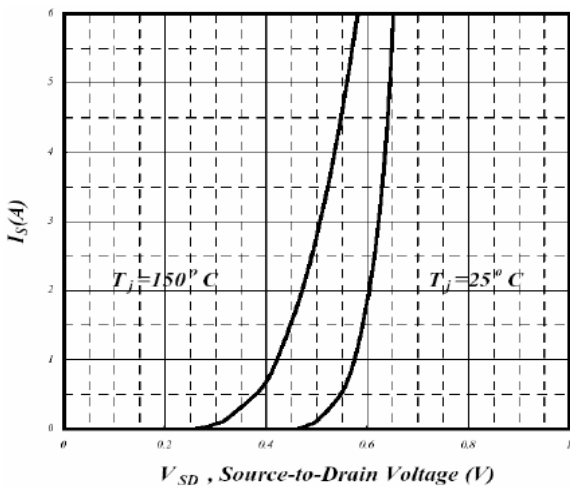


Fig 5. Forward Characteristics of Reverse Diode

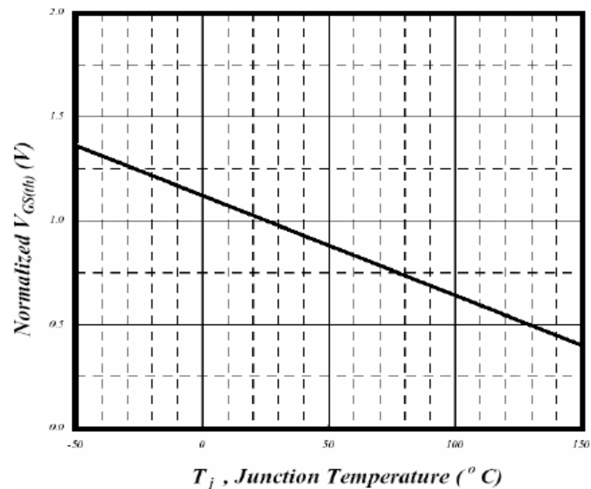


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

Characteristic Curves(Cont.)

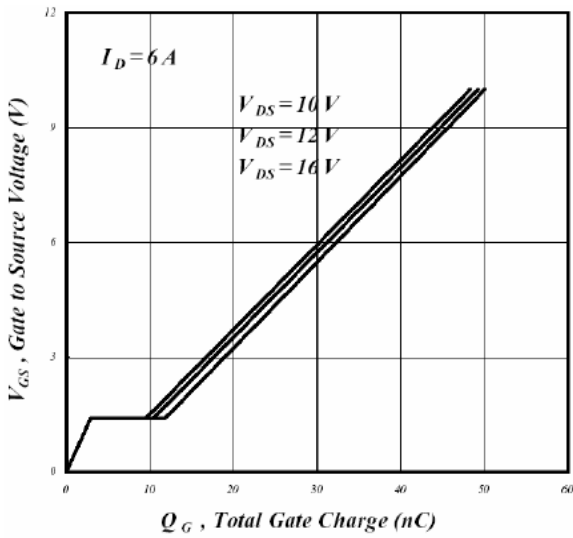


Fig 7. Gate Charge Characteristics

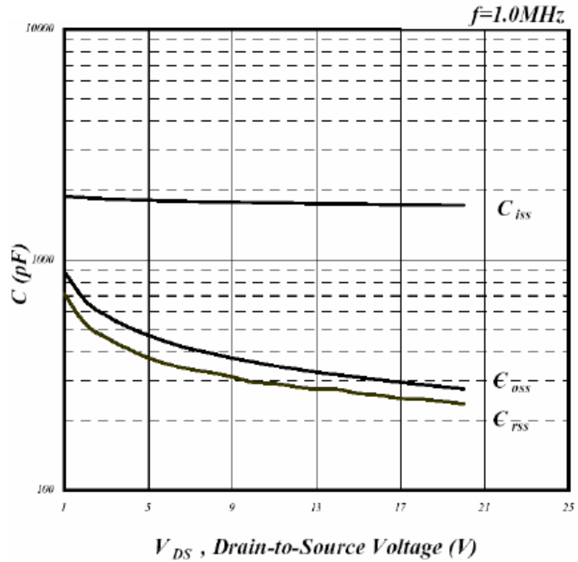


Fig 8. Typical Capacitance Characteristics

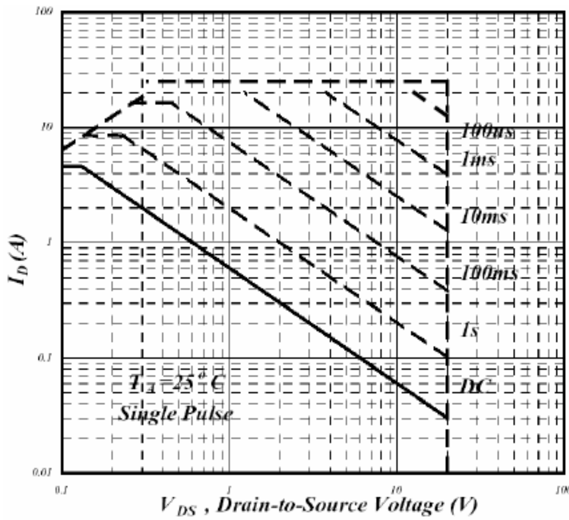


Fig 9. Maximum Safe Operating Area

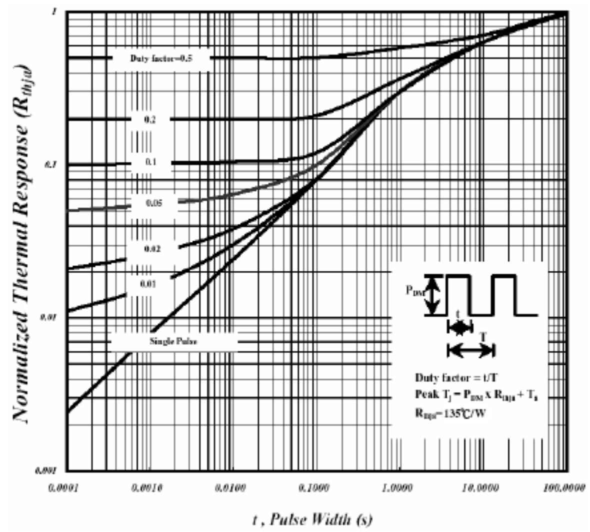


Fig 10. Effective Transient Thermal Impedance

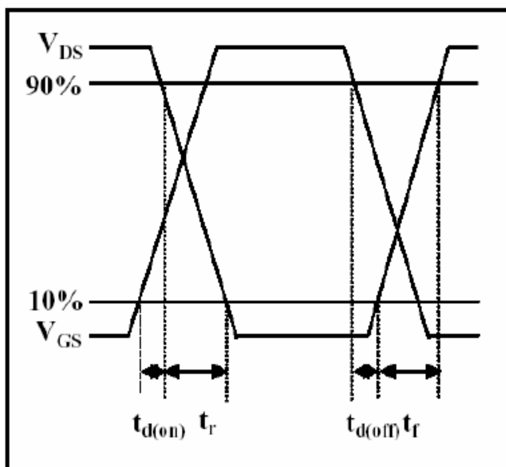


Fig 11. Switching Time Waveform

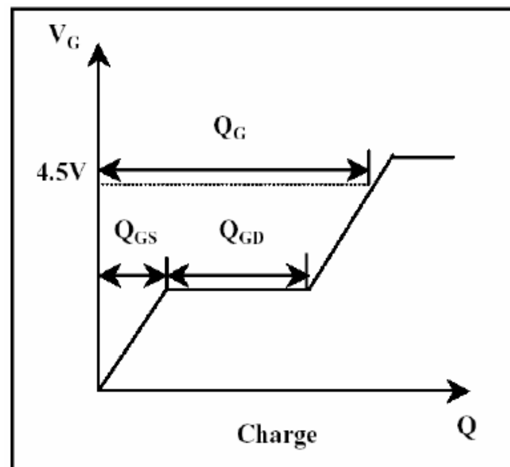
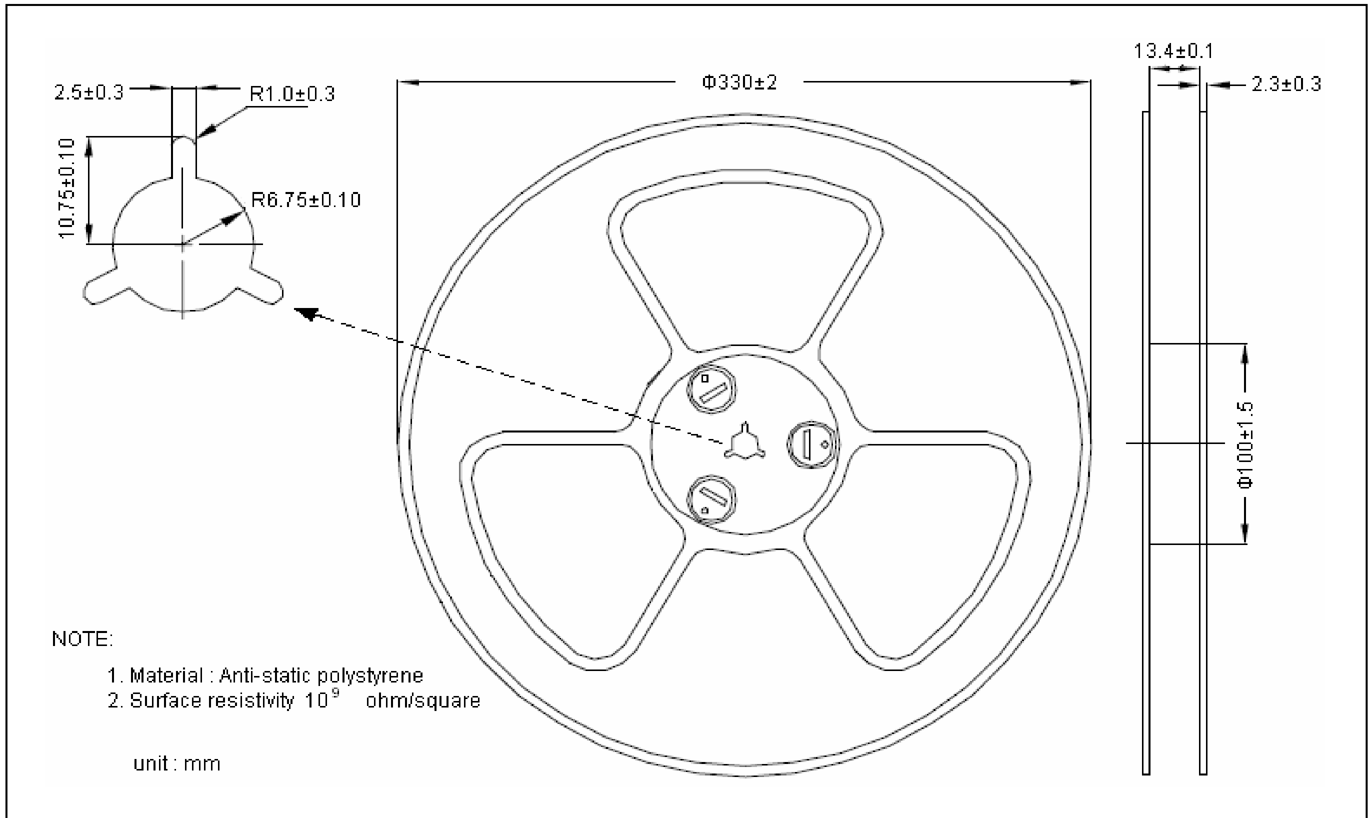
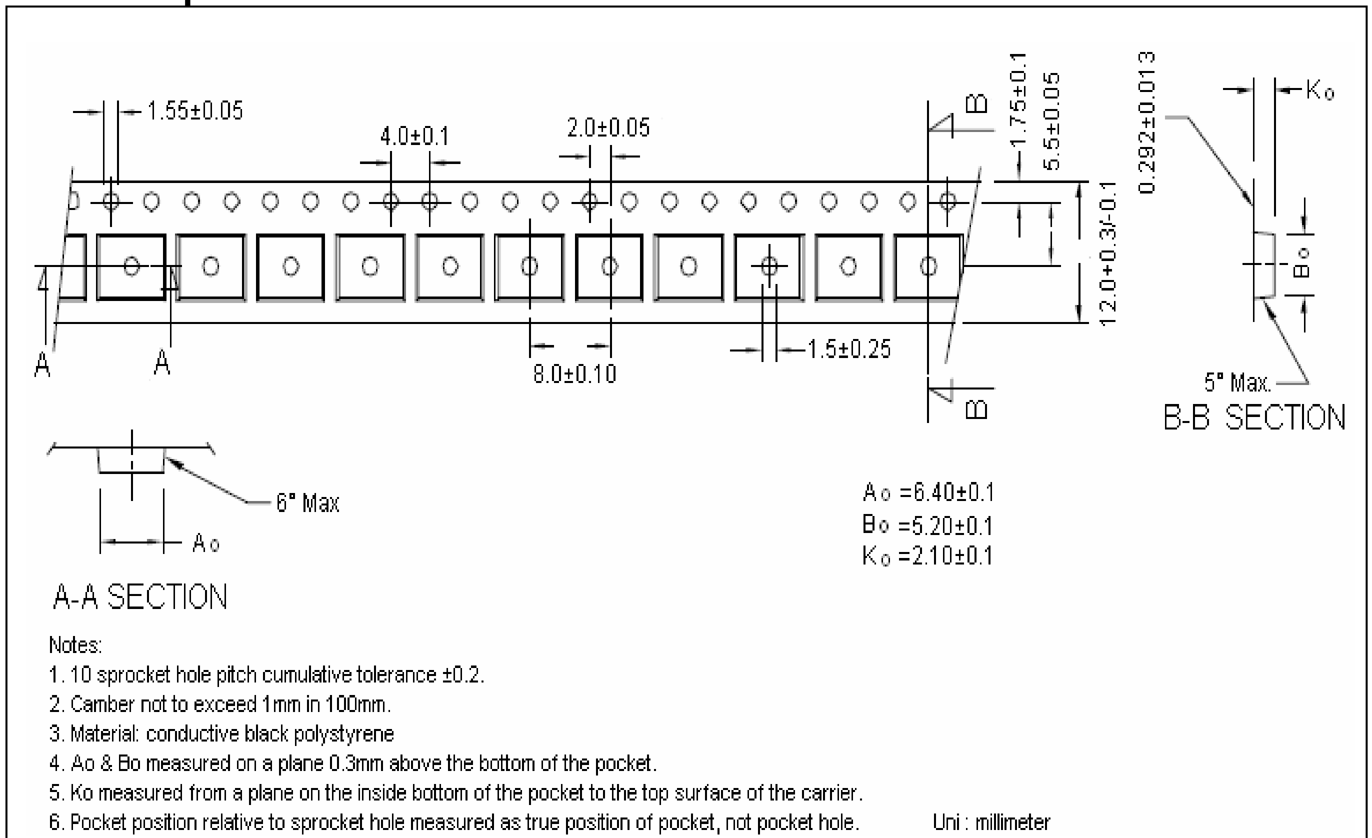


Fig 12. Gate Charge Waveform

Reel Dimension



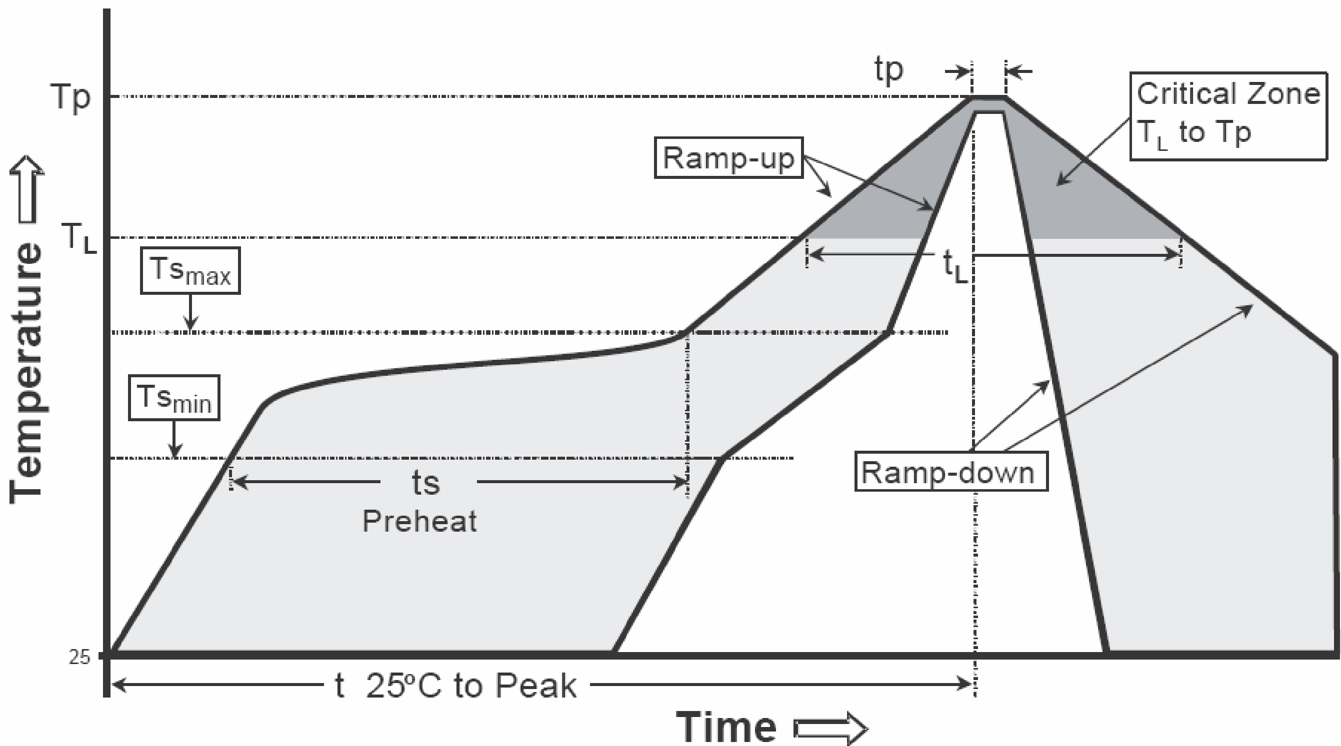
Carrier Tape Dimension



Recommended wave soldering condition

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

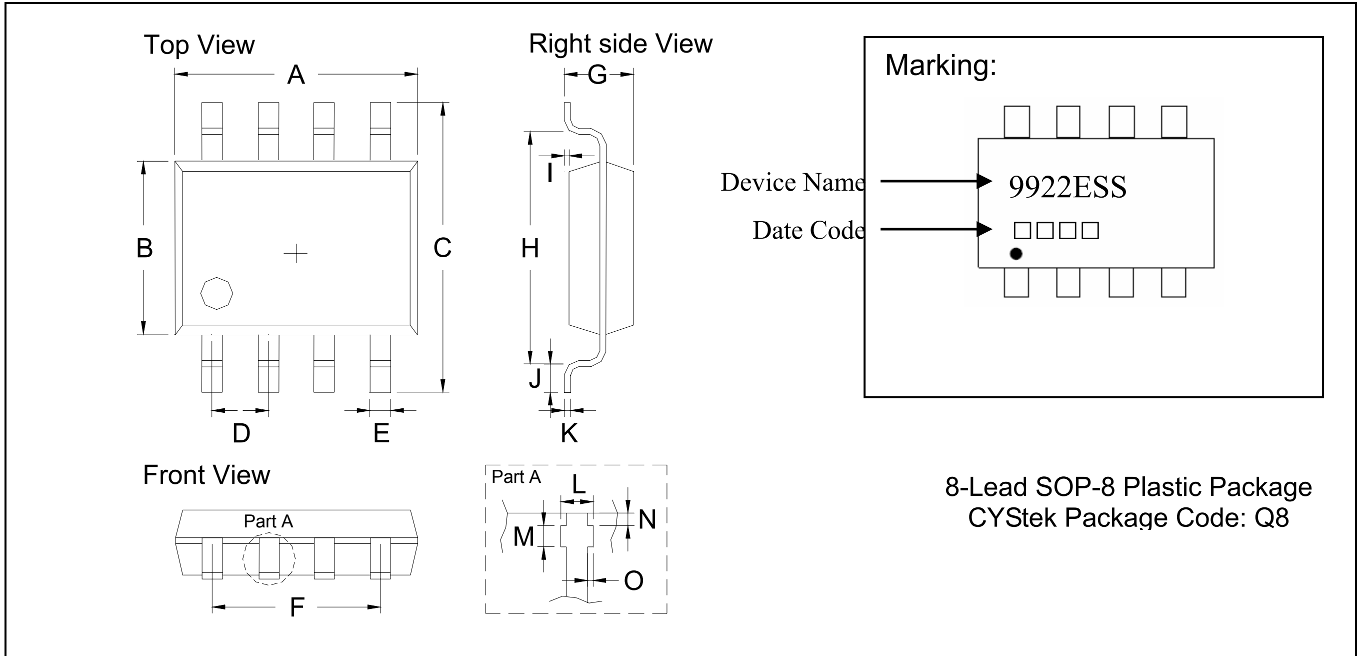
Recommended temperature profile for IR reflow



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(t_S min to t_S 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	0.1890	0.2007	4.80	5.10	I	0.0098	REF	0.25	REF
B	0.1496	0.1654	3.80	4.20	J	0.0118	0.0354	0.30	0.90
C	0.2283	0.2441	5.80	6.20	K	0.0074	0.0098	0.19	0.25
D	0.0480	0.0519	1.22	1.32	L	0.0145	0.0204	0.37	0.52
E	0.0138	0.0193	0.35	0.49	M	0.0118	0.0197	0.30	0.50
F	0.1472	0.1527	3.74	3.88	N	0.0031	0.0051	0.08	0.13
G	0.0531	0.0689	1.35	1.75	O	0.0000	0.0059	0.00	0.15
H	0.1889	0.2007	4.80	5.10					

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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