N- AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

MTC2804Q8

	N-CH	P-CH
BV_{DSS}	40V	-40V
I_D	7A	-6A
$R_{DSON(max)}$	28mΩ	44mΩ

Description

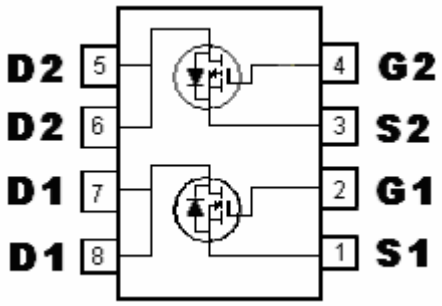
The MTC2804Q8 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single SOP-8 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

Features

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

Equivalent Circuit

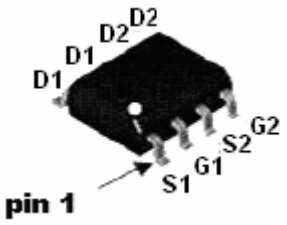
MTC2804Q8



G：Gate
S：Source
D：Drain

Outline

SOP-8



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

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Breakdown Voltage	BV_{DSS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current @T_C=25 °C (Note 1)	I_D	7	-6	A
Continuous Drain Current @T_C=100 °C (Note 1)	I_D	6	-5	A
Pulsed Drain Current (Note 2)	I_{DM}	28	-24	A
Total Power Dissipation @T_A=25°C (Note 1)	Pd	2.4		W
Linear Derating Factor		0.016		W / °C
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+175		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,ja	62.5		°C/W
Thermal Resistance, Junction-to-Case	Rth,jc	25		°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

N-Channel Electrical Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	40	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	1.0	1.5	3.0	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=32V, V_{GS}=0
	-	-	25	μA	V_{DS}=30V, V_{GS}=0, Tj=125°C
*$R_{DS(ON)}$	-	25	28	mΩ	I_D=7A, V_{GS}=10V
	-	30	36		I_D=6A, V_{GS}=7V
*G_{FS}	-	19	-	S	V_{DS}=5V, I_D=7A
Dynamic					
Ciss	-	916	-	pF	V_{DS}=20V, V_{GS}=0, f=1MHz
Coss	-	79	-		
Crss	-	56	-		
*$t_{d(ON)}$	-	2.3	-	ns	V_{DS}=10V, I_D=1A, V_{GS}=10V, R_G=6Ω
*t_r	-	7.2	-		
*$t_{d(OFF)}$	-	11	-		
*t_f	-	6	-		
*Qg	-	9.1	-	nC	V_{DS}=20V, I_D=7A, V_{GS}=10V
*Qgs	-	2.3	-		
*Qgd	-	3	-		
Source-Drain Diode					
*V_{SD}	-	-	1.3	V	V_{GS}=0V, I_S=7A
*I_S	-	-	7	A	
*I_{SM}	-	-	20	A	

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

P-Channel Electrical Characteristics (Tc=25°C, unless otherwise specified)

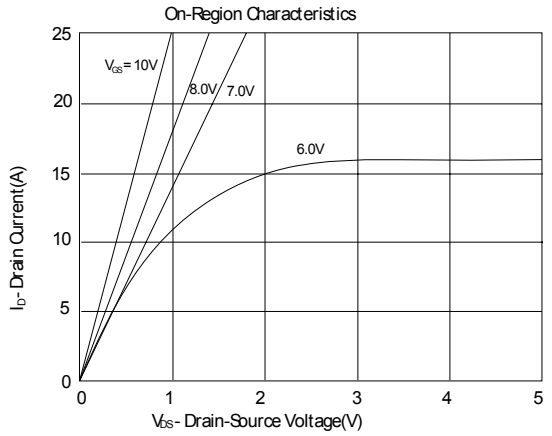
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-40	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-1.0	-1.5	-3.0	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	-1	μA	V_{DS}=-32V, V_{GS}=0
	-	-	-25	μA	V_{DS}=-30V, V_{GS}=0, Tj=125°C
*$R_{DS(ON)}$	-	38	44	mΩ	I_D=-6A, V_{GS}=-10V
	-	46	55		I_D=-5A, V_{GS}=-7V
*G_{FS}	-	11	-	S	V_{DS}=-5V, I_D=-6A
Dynamic					
Ciss	-	1039	-	pF	V_{DS}=-20V, V_{GS}=0, f=1MHz
Coss	-	327	-		
Crss	-	301	-		
*$t_{d(ON)}$	-	6.5	-	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-10V, R_G=6Ω
*t_r	-	9.5	-		
*$t_{d(OFF)}$	-	18	-		
*t_f	-	10	-		
*Qg	-	9	-	nC	V_{DS}=-20V, I_D=-6A, V_{GS}=-10V
*Qgs	-	1.5	-		
*Qgd	-	2.9	-		
Source-Drain Diode					
*V_{SD}	-	-	-1.3	V	V_{GS}=0V, I_S=-6A
*I_S	-	-	-6	A	
*I_{SM}	-	-	-20		

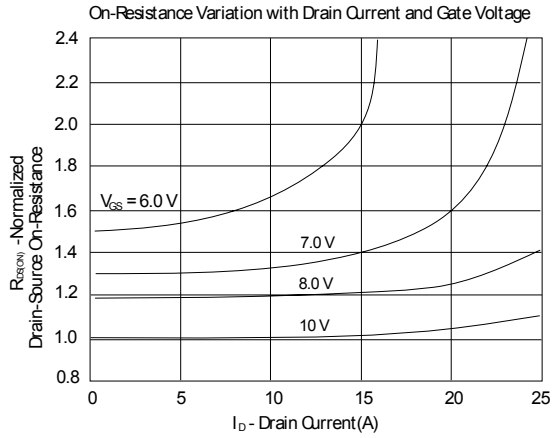
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

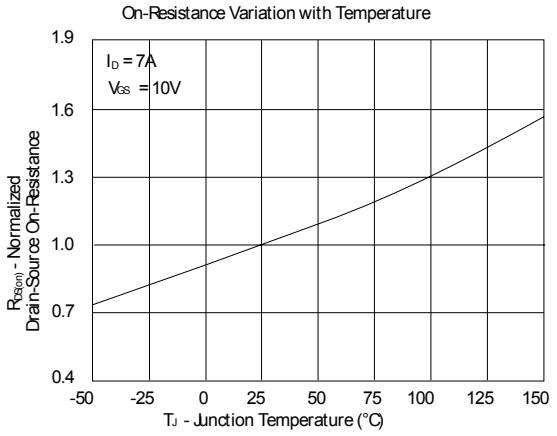
Ordering Information

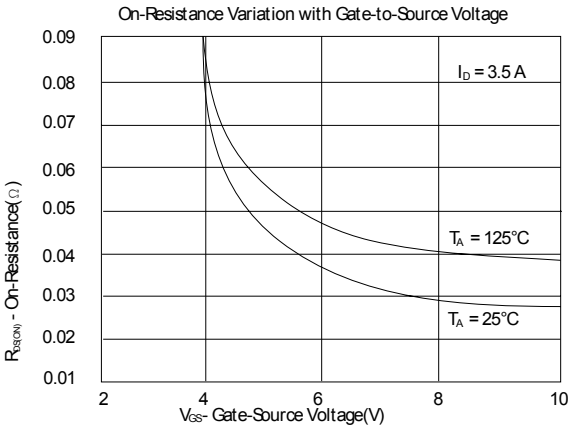
Device	Package	Shipping	Marking
MTC2804Q8	SOP-8 (Pb-free lead plating package)	3000 pcs / Tape & Reel	2804SS

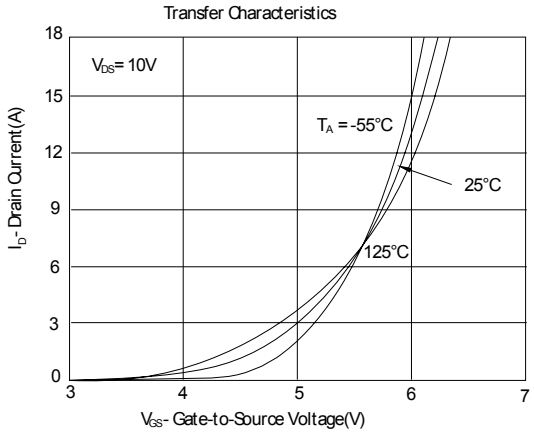
N-channel Characteristic Curves

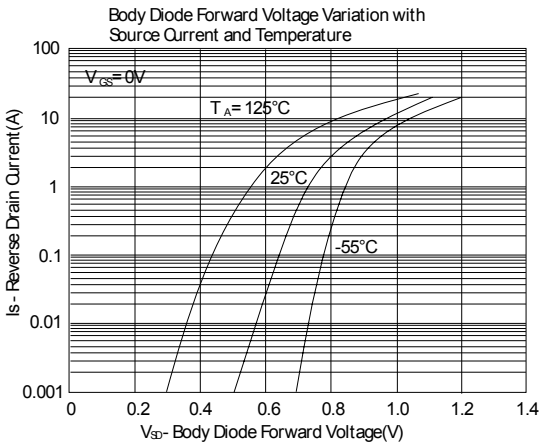




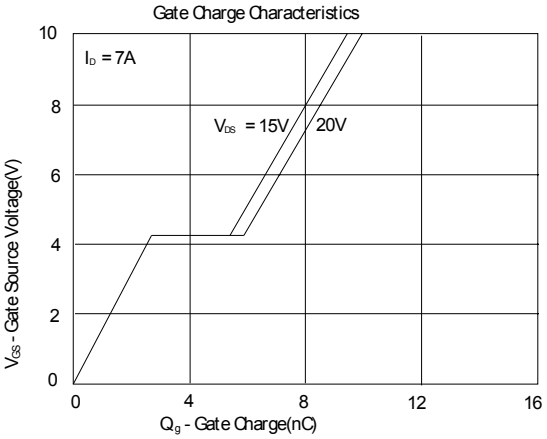


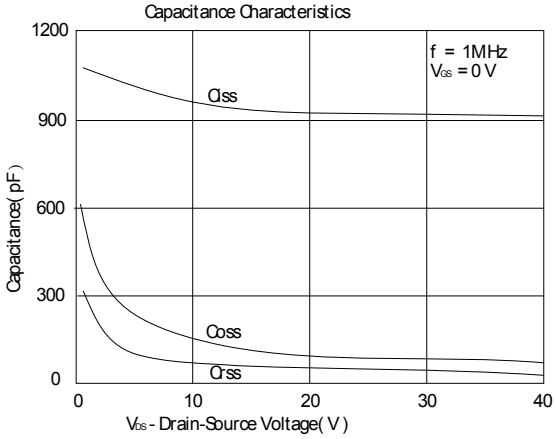


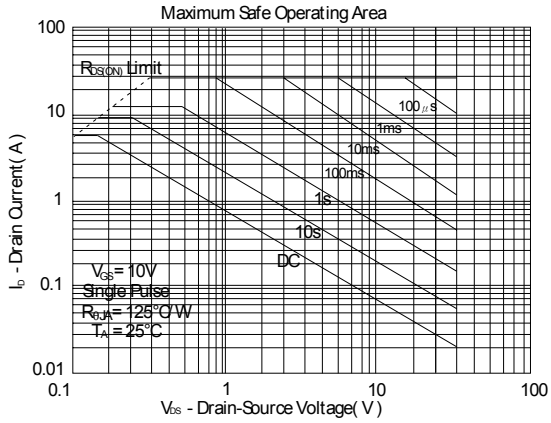


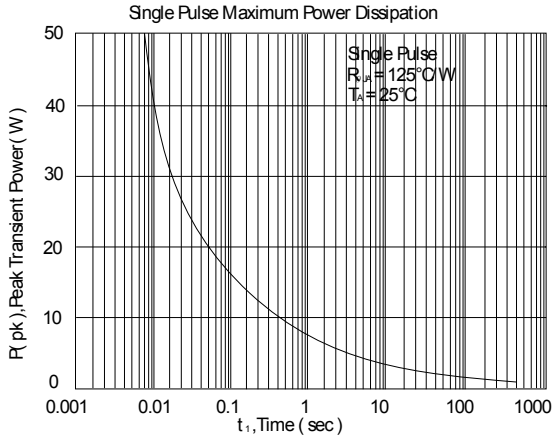


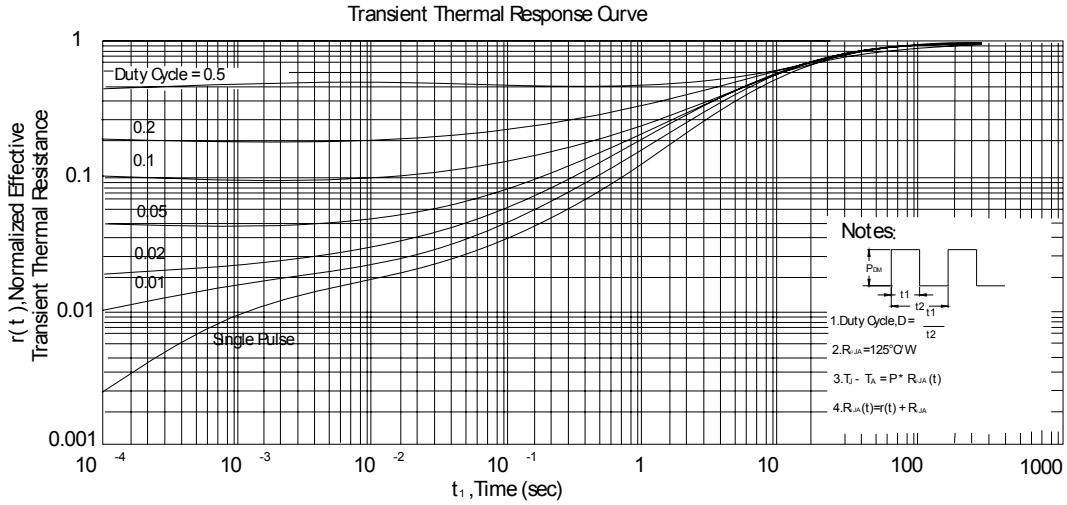
N-channel Characteristic Curves(Cont.)



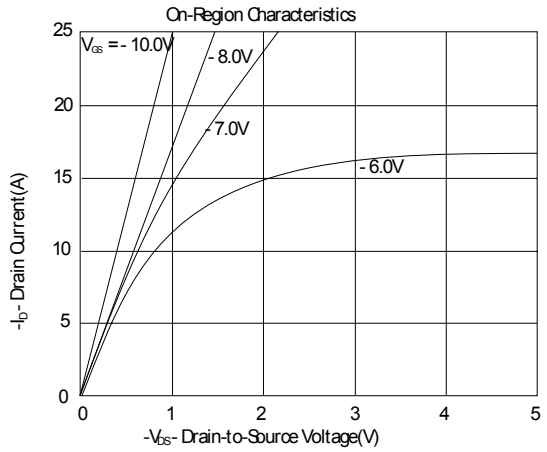


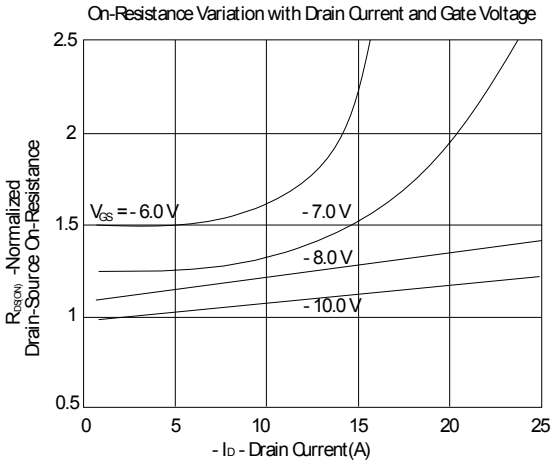


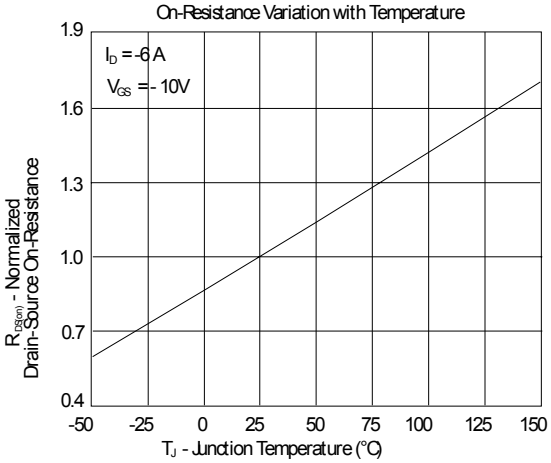


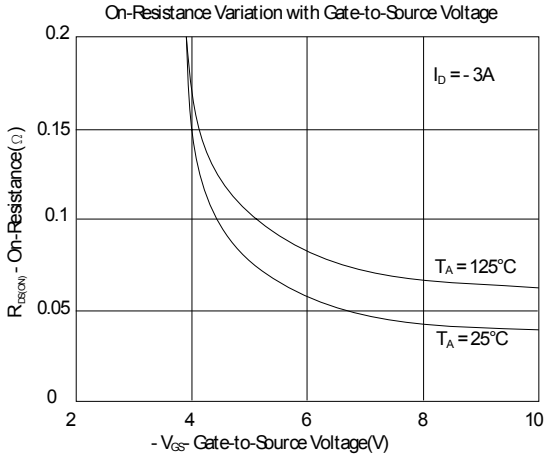


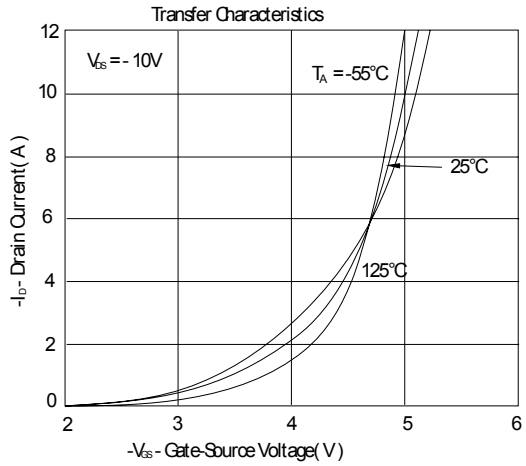
P-channel Characteristic Curves

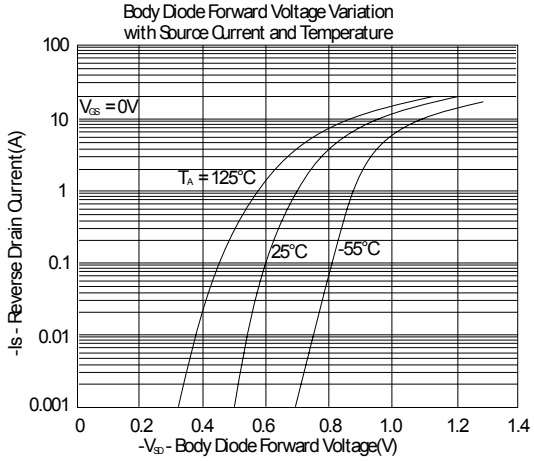






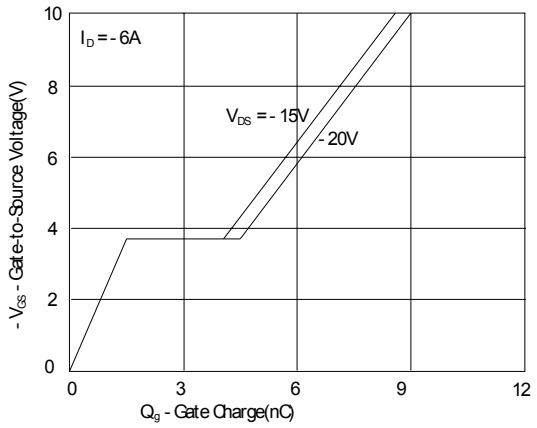




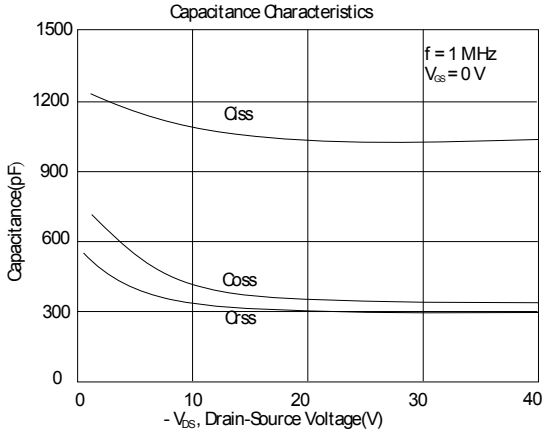


P-channel Characteristic Curves(Cont.)

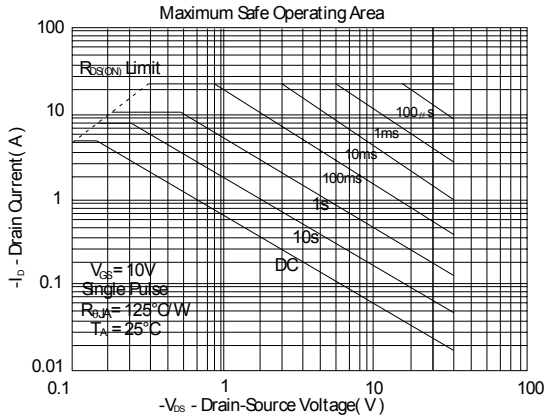
Gate Charge Characteristics



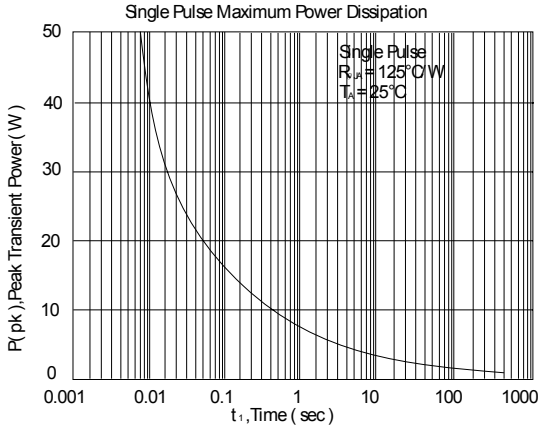
Capacitance Characteristics



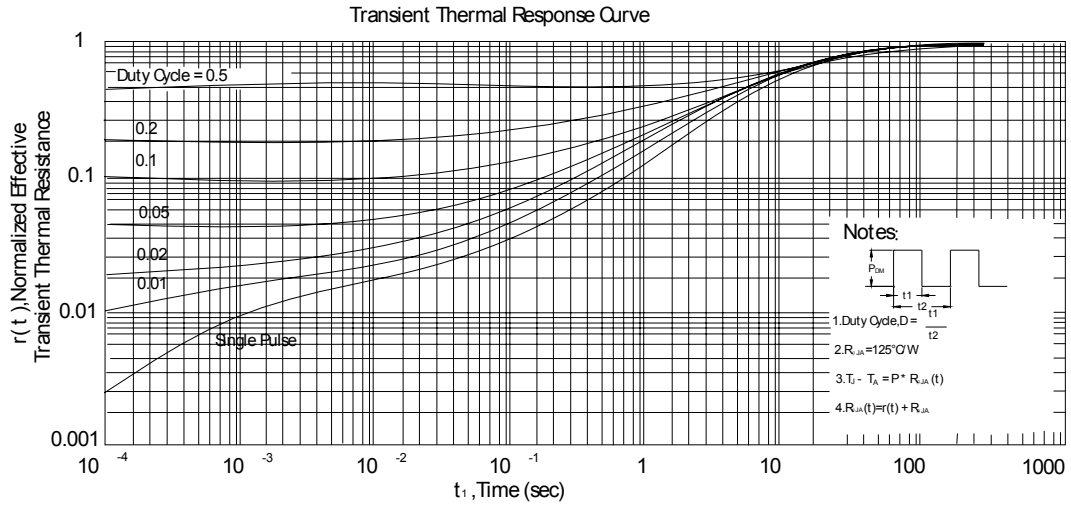
Maximum Safe Operating Area



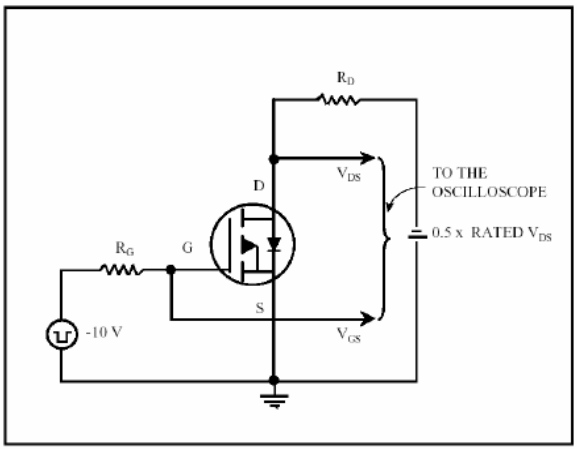
Single Pulse Maximum Power Dissipation

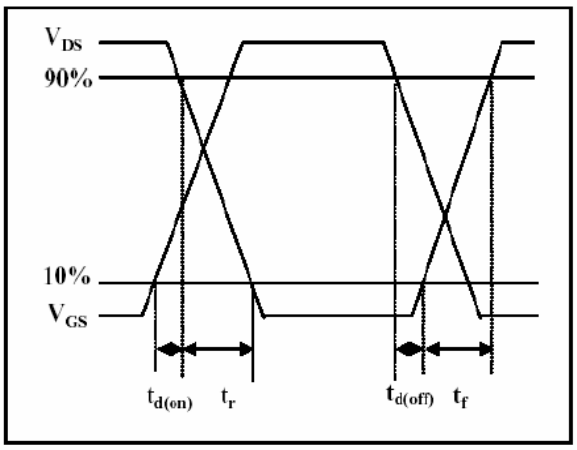


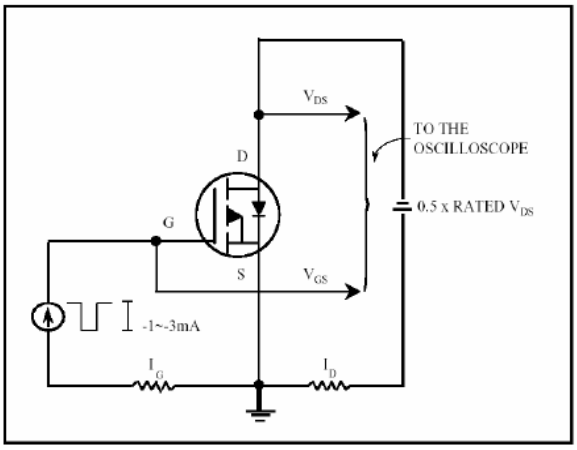
Transient Thermal Response Curve

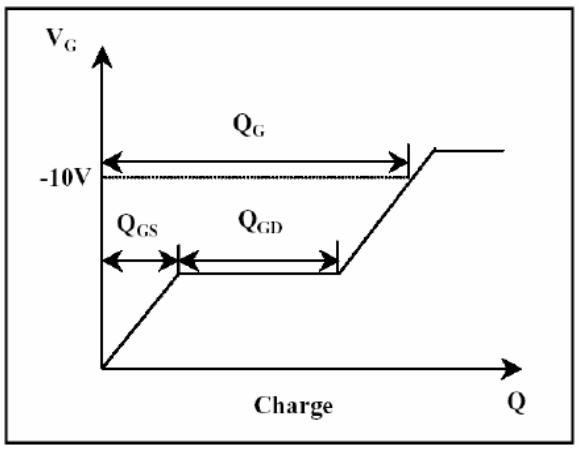


Test Circuit and Waveforms

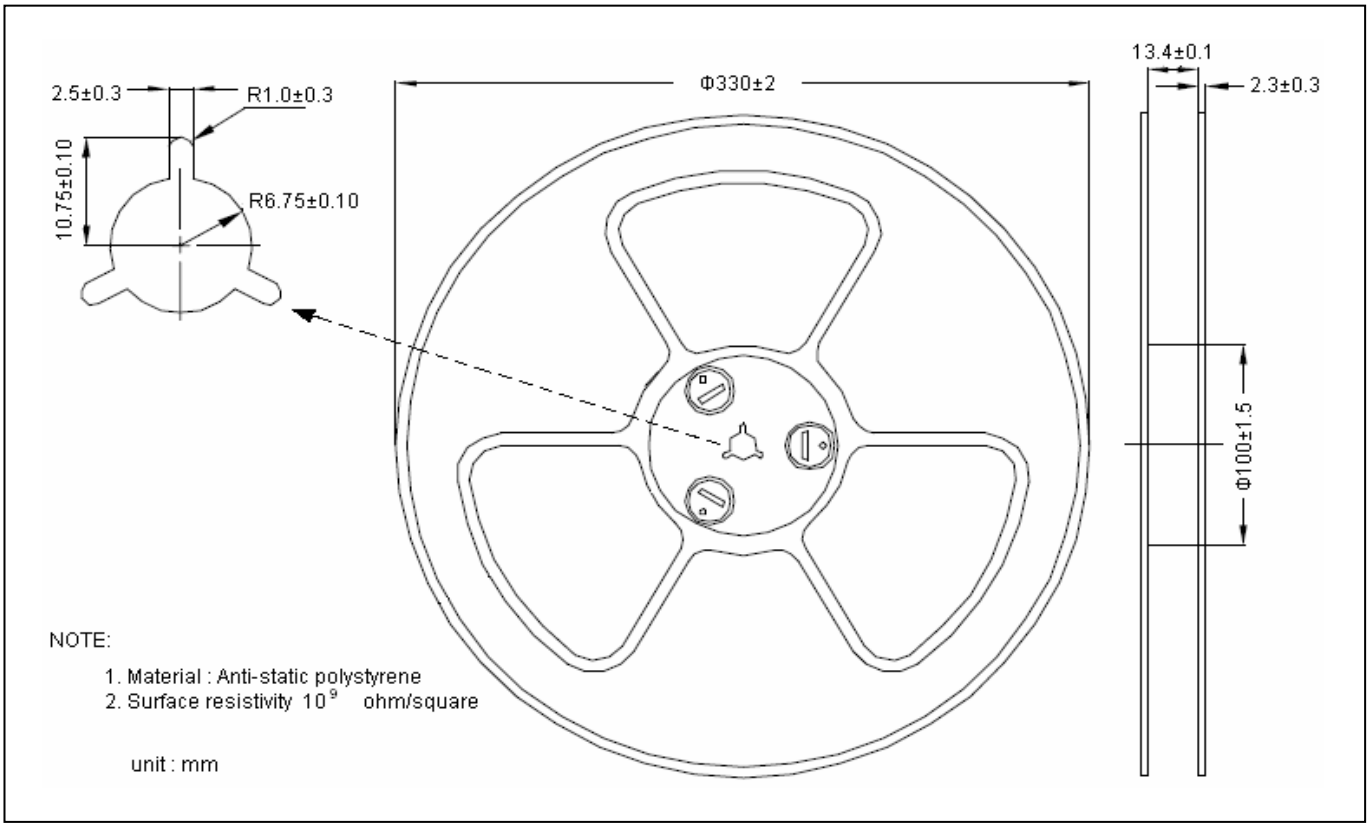




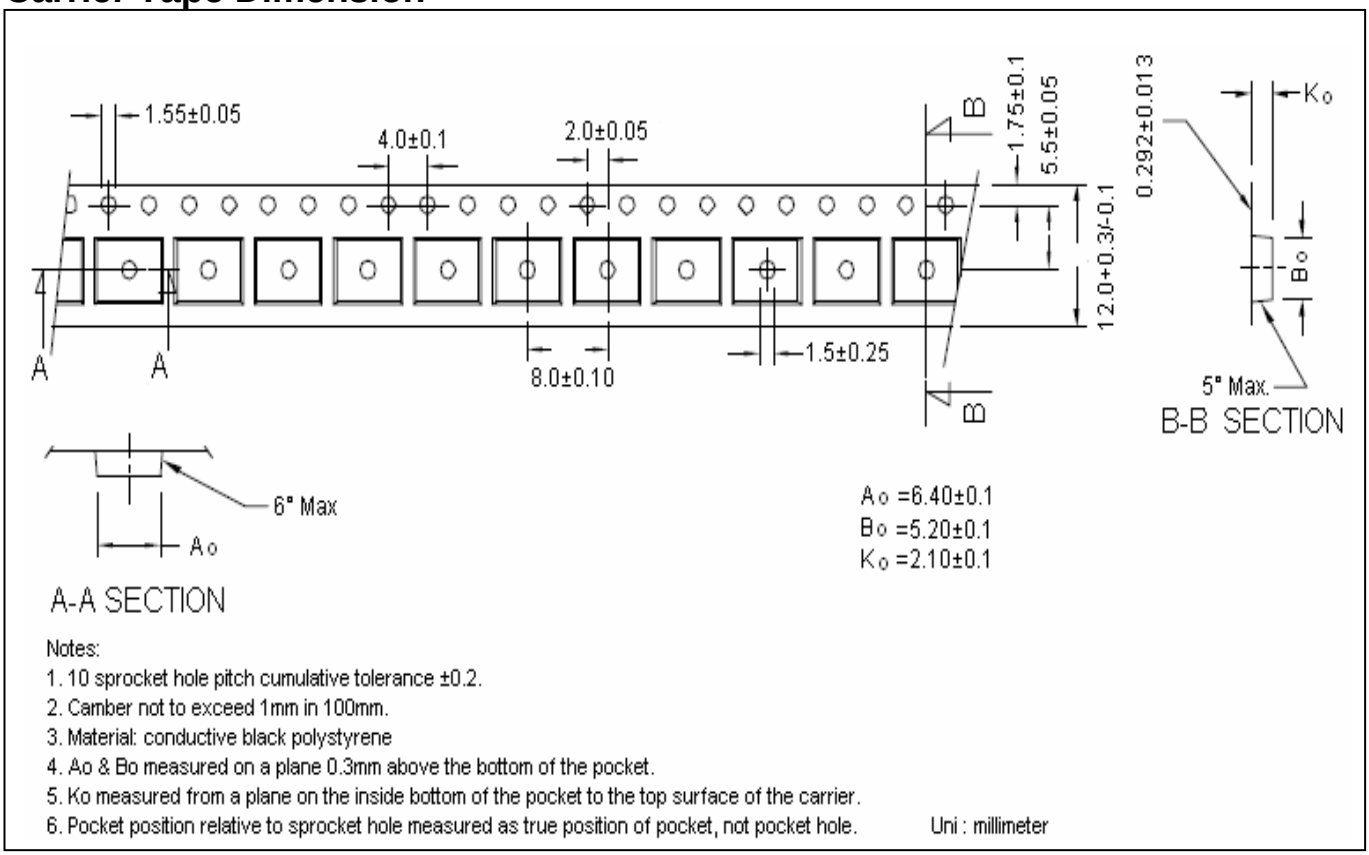




Reel Dimension



Carrier Tape Dimension



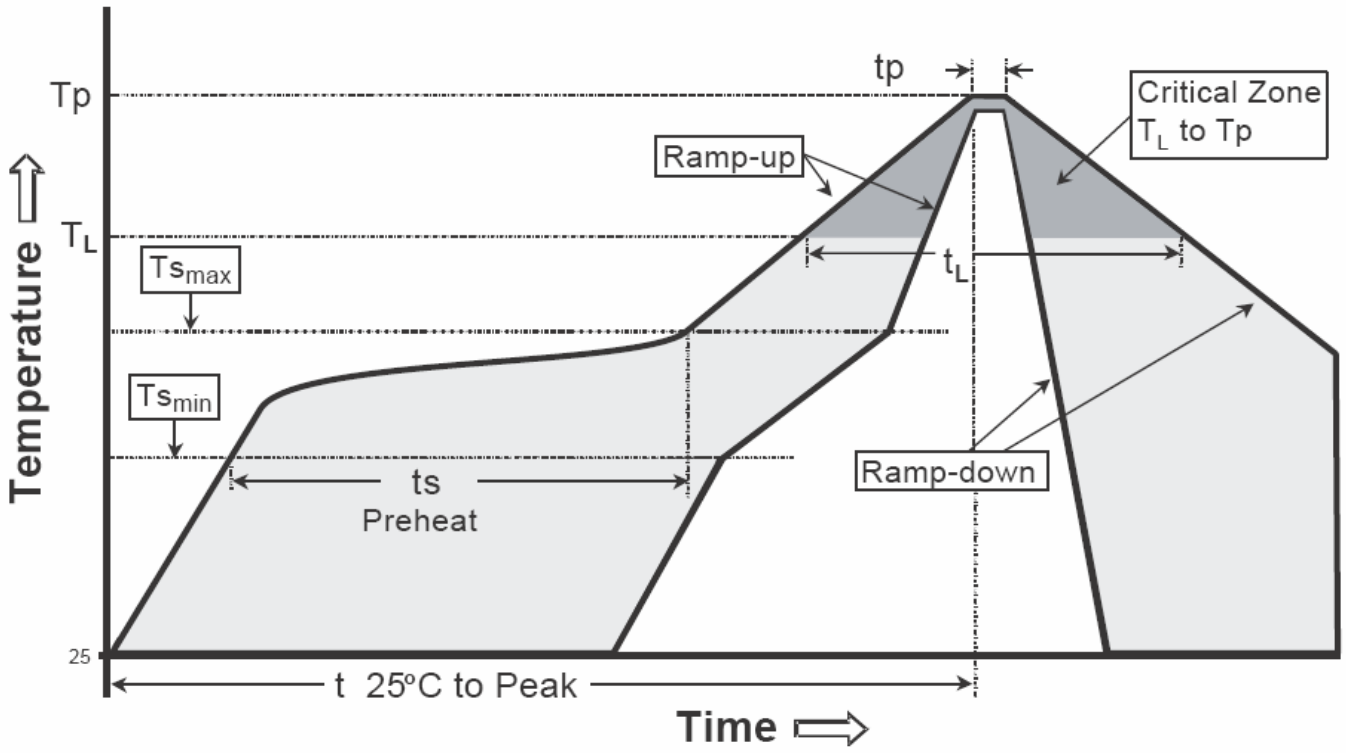
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Uni : millimeter

Recommended wave soldering condition

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

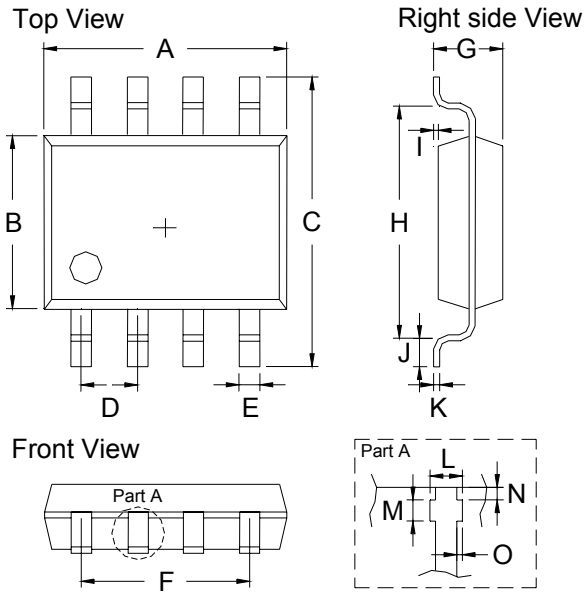
Recommended temperature profile for IR reflow

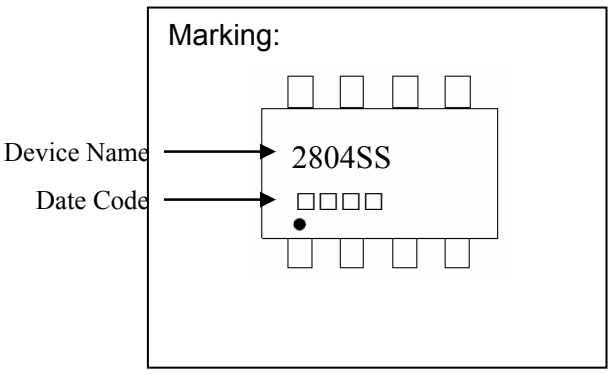


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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





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

*: 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.