N- AND P-Channel Logic Level Enhancement Mode MOSFET

MTC2402Q8

	N-CH	P-CH
BV_{DSS}	20V	-20V
I_D	8.5A	-7.9A
R_{DSON}(typ.) @V_{GS}=(-)4.5V	20mΩ	25mΩ
R_{DSON}(typ.) @V_{GS}=(-)2.5V	28mΩ	35mΩ

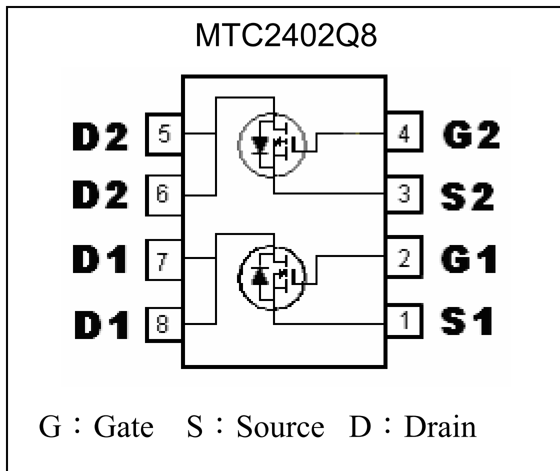
Description

The MTC2402Q8 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.

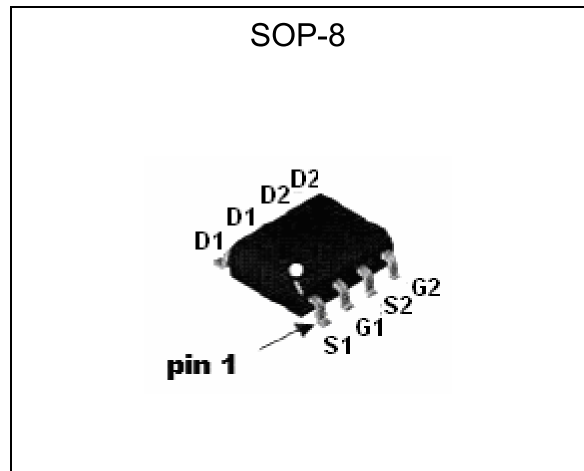
Features

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

Equivalent Circuit

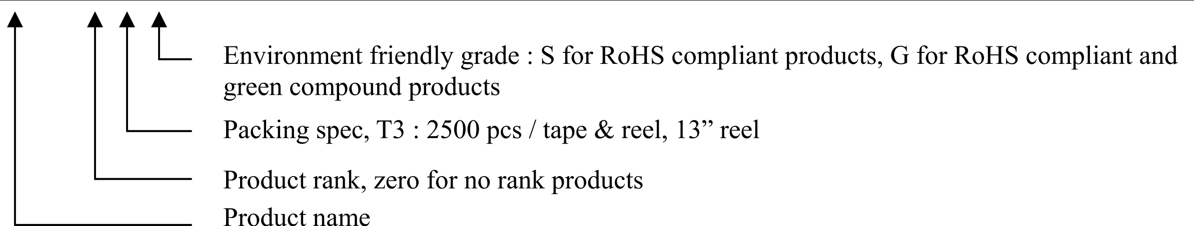


Outline



Ordering Information

Device	Package	Shipping
MTC2402Q8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel



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

Parameter		Symbol	Limits		Unit
			N-channel	P-channel	
Drain-Source Breakdown Voltage		BV_{DSS}	20	-20	V
Gate-Source Voltage		V_{GS}	±12	±12	V
Continuous Drain Current (Note 2)	T_A=25 °C, V_{GS}=4.5V (-4.5V)	I_D	8.5	-7.9	A
	T_A=70 °C, V_{GS}=4.5V (-4.5V)		6.8	-6.3	A
Pulsed Drain Current (Note 1)		I_{DM}	40	-30	A
Power Dissipation (Note 2)	T_A=25°C		2.5		W
	T_A=70°C		1.6		W
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+150		°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	25	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	50 (Note 2)	°C/W
Lead Temperature(1/16” from case, for 10 seconds)	T_L	275	°C

Note : 1.Pulse width limited by maximum junction temperature.
2.Surface mounted on 1 in² copper pad of FR-4 board, pulse width≤10s.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	0.5	0.7	1.2	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=20V, V_{GS}=0
	-	-	25	μA	V_{DS}=20V, V_{GS}=0, Tj=125°C
*$R_{DS(ON)}$	-	20	24	mΩ	V_{GS}=4.5V, I_D=8A
	-	28	36	mΩ	V_{GS}=2.5V, I_D=5.2A
*G_{FS}	-	8	-	S	V_{DS}=5V, I_D=3A
Dynamic					
Ciss	-	762	995	pF	V_{DS}=10V, V_{GS}=0, f=1MHz
Coss	-	74	96	pF	
Crss	-	87	115	pF	
*$t_{d(ON)}$	-	7.8	16	ns	V_{DS}=10V, I_D=1A, V_{GS}=4.5V, R_G=10Ω
*tr	-	9.5	19	ns	
*$t_{d(OFF)}$	-	37	74	ns	
*tf	-	23	46	ns	
*Qg	-	8	11	nC	V_{DS}=10V, I_D=5A, V_{GS}=4.5V
*Qgs	-	0.9	1.2	nC	
*Qgd	-	2.6	3.4	nC	

Body Diode					
*I_S	-	-	1.9	A	
*I_{SM}	-	-	7.6		
*V_{SD}	-	0.76	1.2	V	V_{GS}=0V, I_S=1A

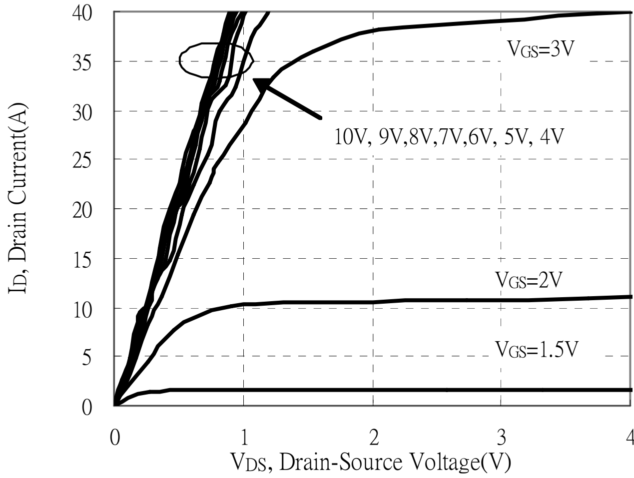
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

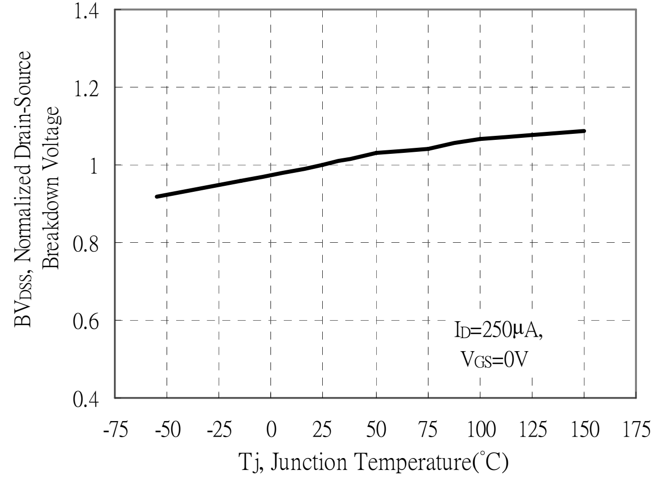
P-Channel Electrical Characteristics (Tc=25°C, unless otherwise specified)

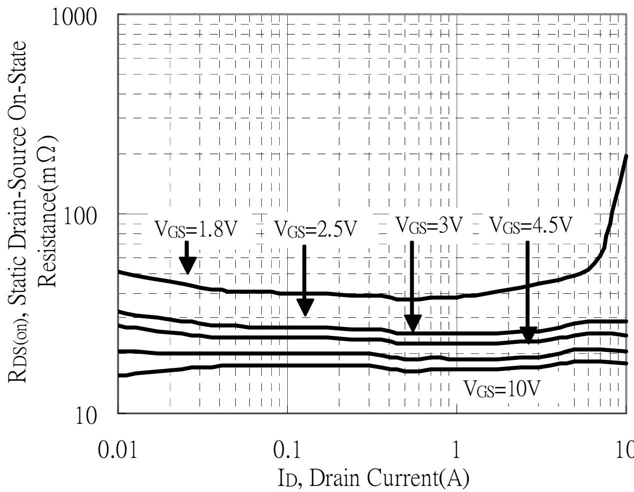
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-0.5	-0.7	-1.2		V_{DS}=VGS, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0
I_{DSS}	-	-	-1	μA	V_{DS}=-20V, V_{GS}=0
	-	-	-25		V_{DS}=-20V, V_{GS}=0, Tj=125°C
*$R_{DS(ON)}$	-	25	42	mΩ	V_{GS}=-4.5V, I_D=-5A
	-	35	52		V_{GS}=-2.5V, I_D=-4A
*G_{FS}	-	10	-	S	V_{DS}=-5V, I_D=-3A
Dynamic					
Ciss	-	1916	2490	pF	V_{DS}=-10V, V_{GS}=0, f=1MHz
Coss	-	159	210		
Crss	-	132	175		
*td(ON)	-	20	40	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V, R_G=10Ω
*tr	-	29	58		
*td(OFF)	-	63	126		
*tf	-	36	72		
*Qg	-	14	19	nC	V_{DS}=-10V, I_D=-5A, V_{GS}=-4.5V
*Qgs	-	2.2	2.9		
*Qgd	-	3.9	5.1		
Body Diode					
*I_S	-	-	-1.9	A	
*I_{SM}	-	-	-7.6		
*V_{SD}	-	-0.73	-1.2	V	V_{GS}=0V, I_S=-6.8A

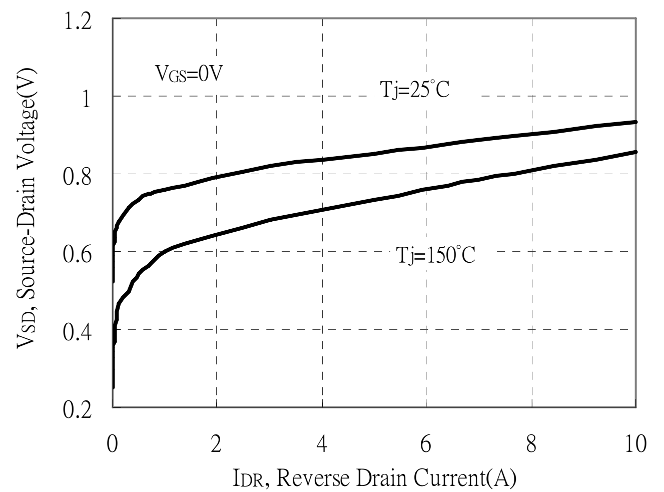
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

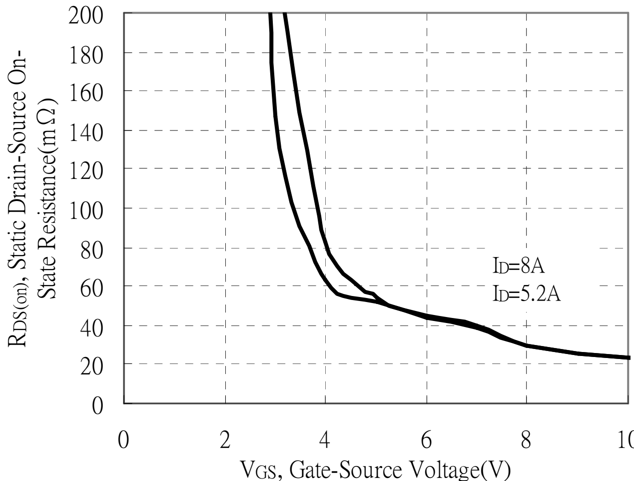
Typical Characteristics : Q1(N-channel)

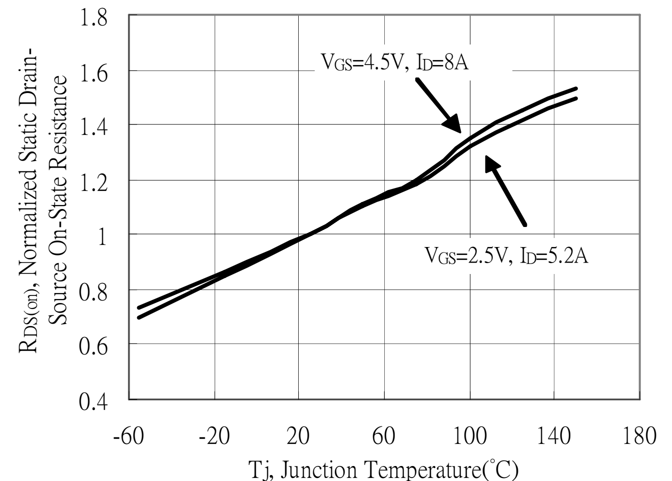




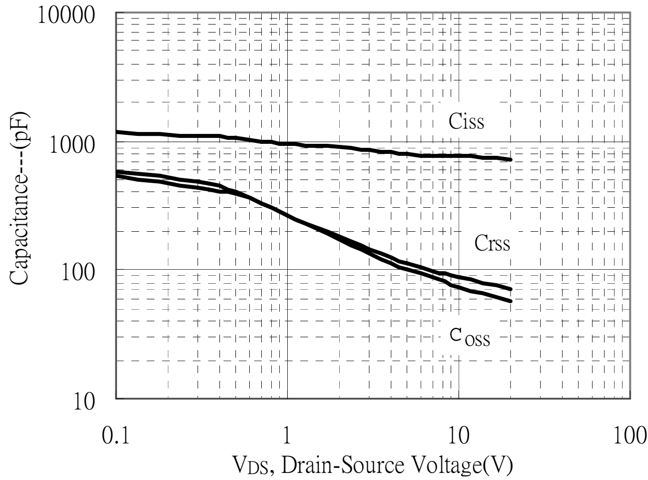


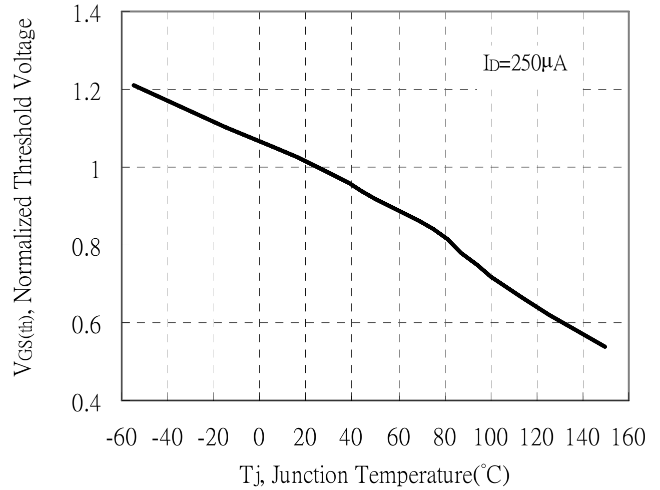


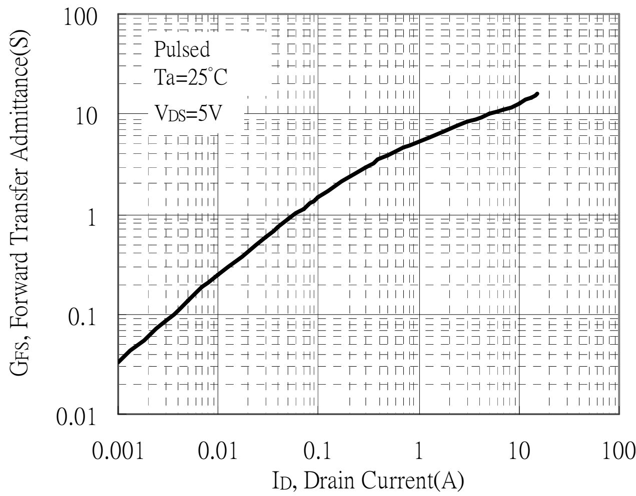


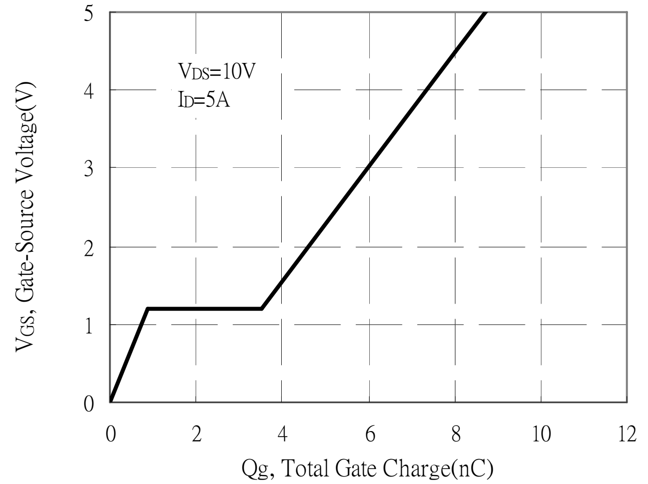


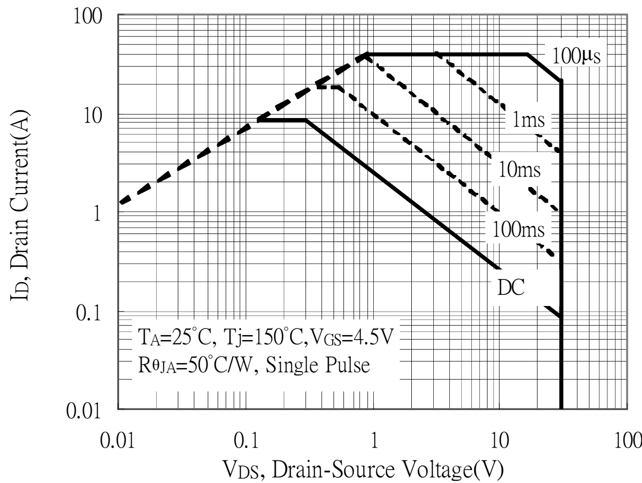
Typical Characteristics(Cont.) : Q1(N-channel)

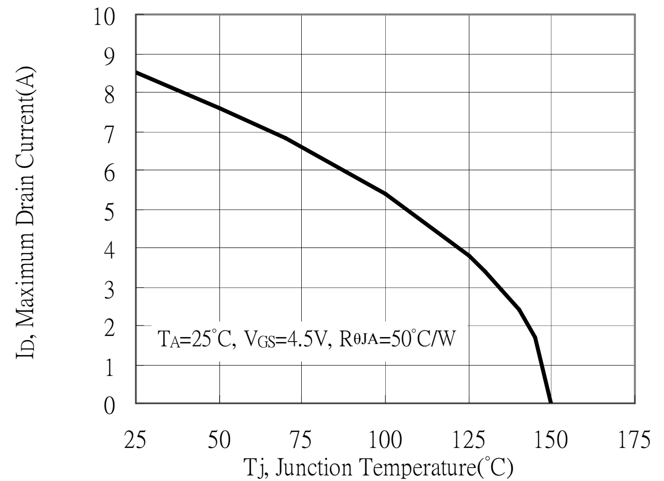




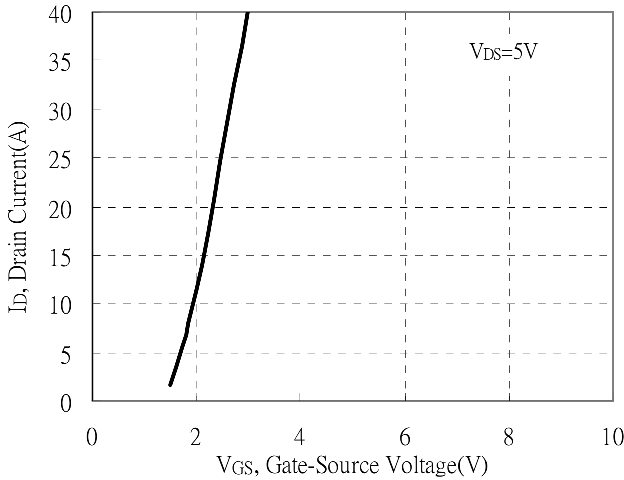


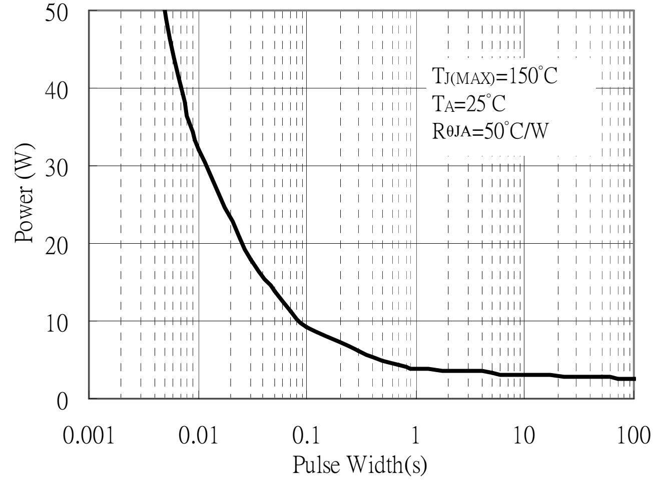


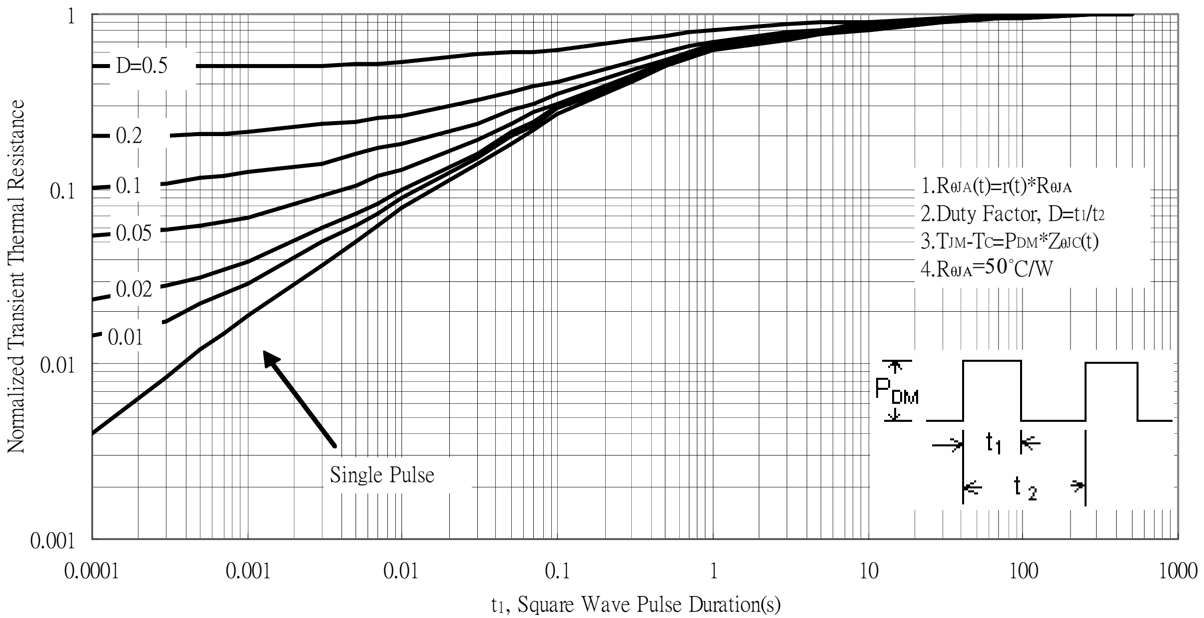




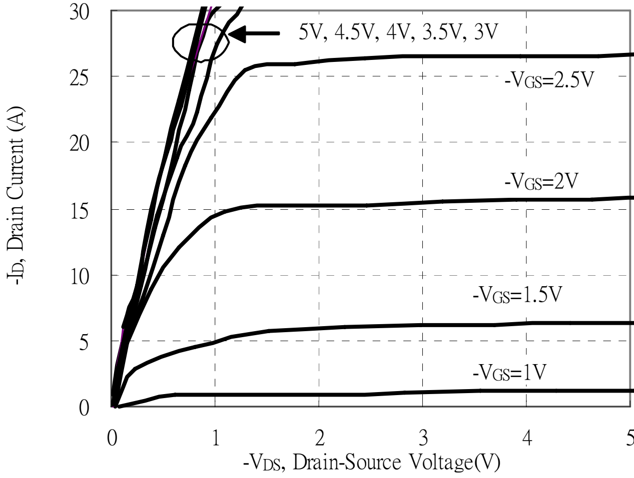
Typical Characteristics(Cont.) : Q1(N-channel)

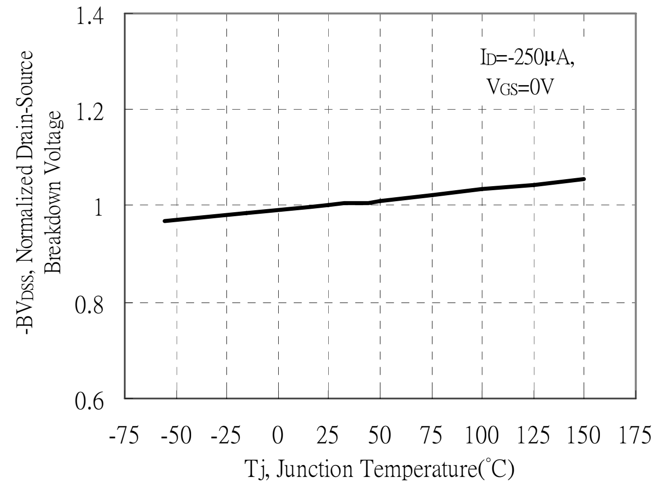


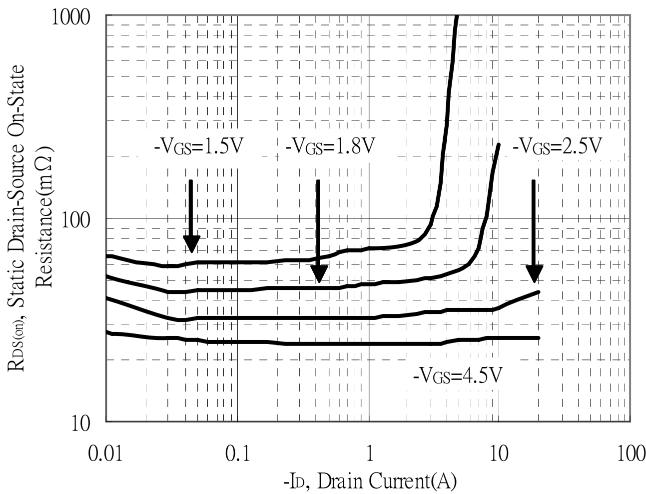


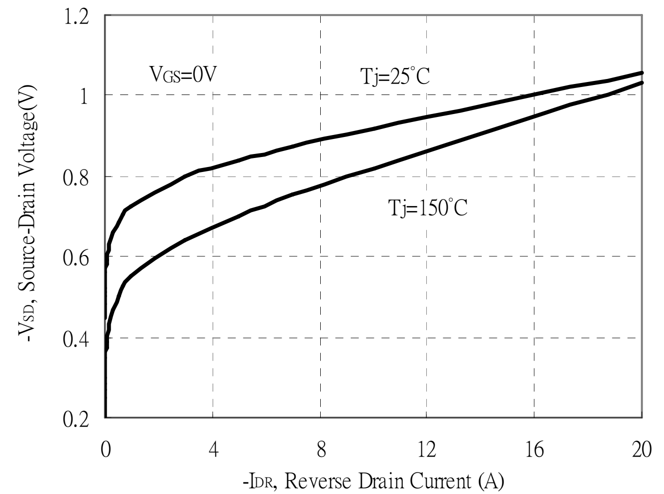


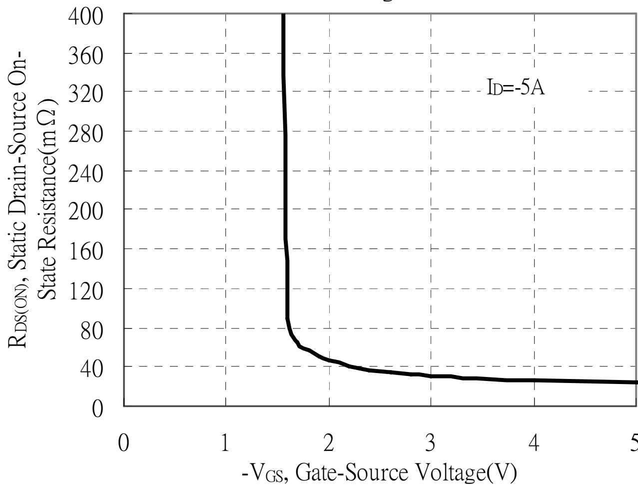
Typical Characteristics : Q2(P-channel)

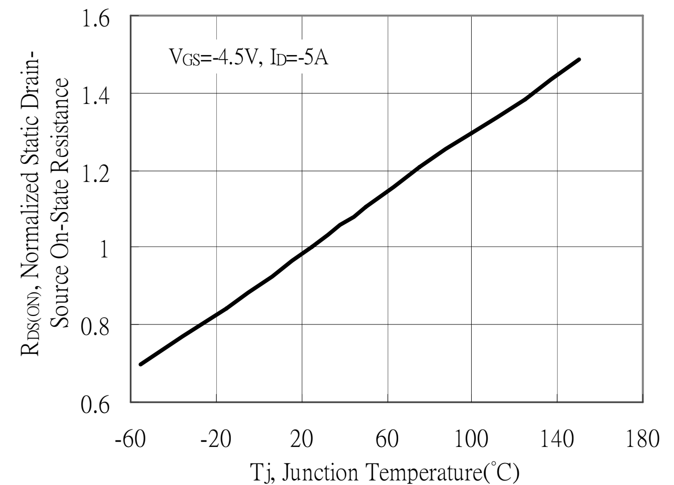




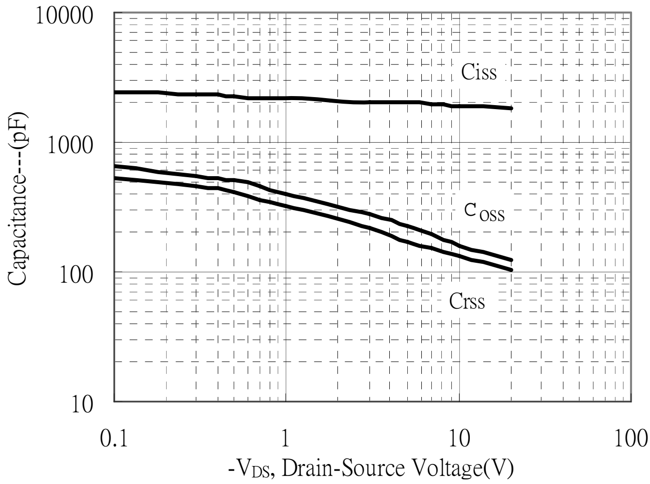


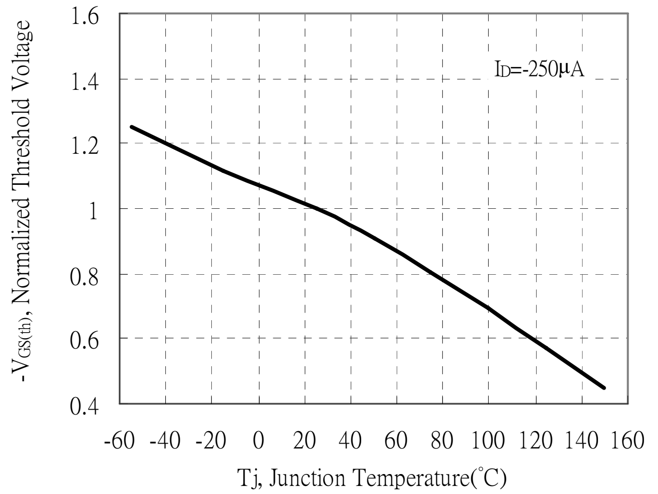


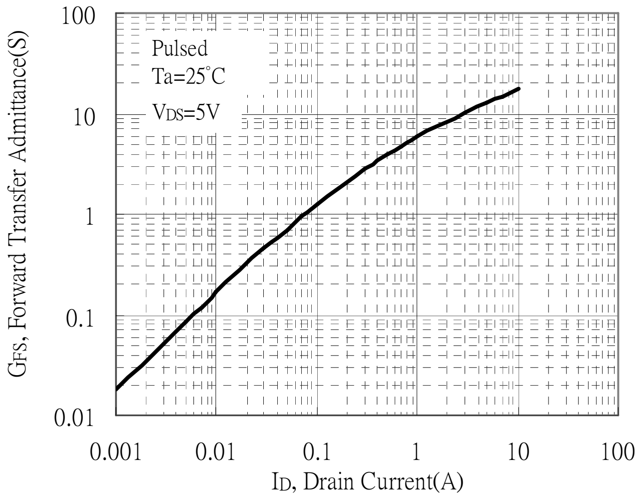


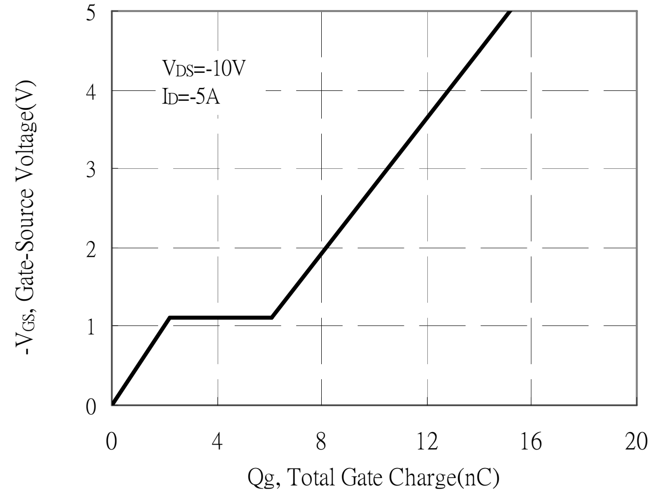


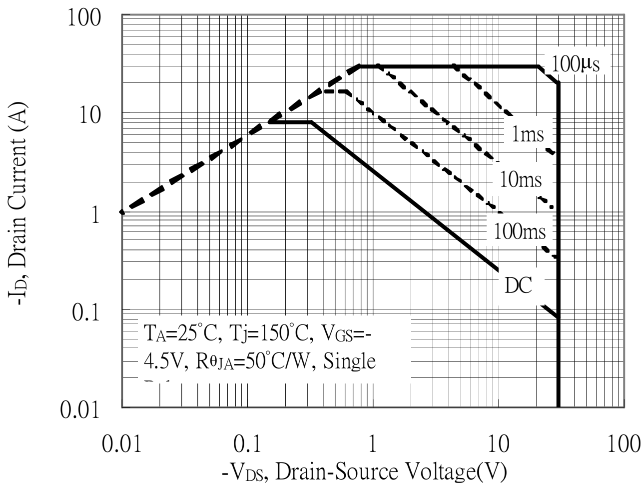
Typical Characteristics(Cont.) : Q2(P-channel)

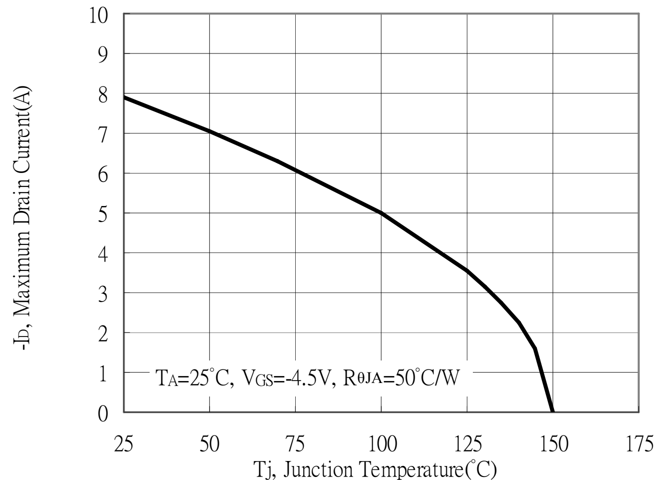




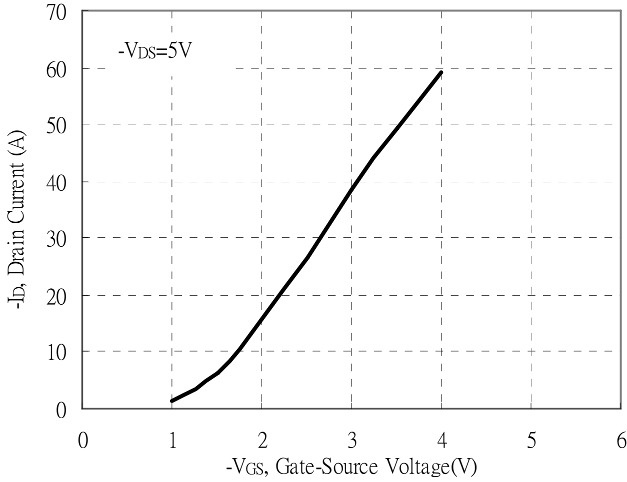


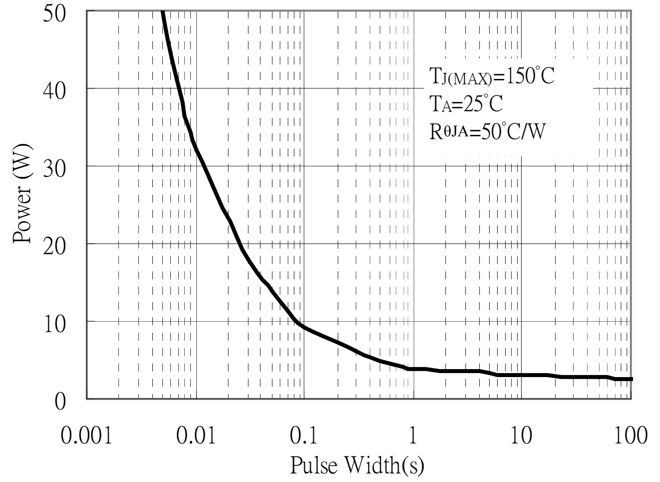


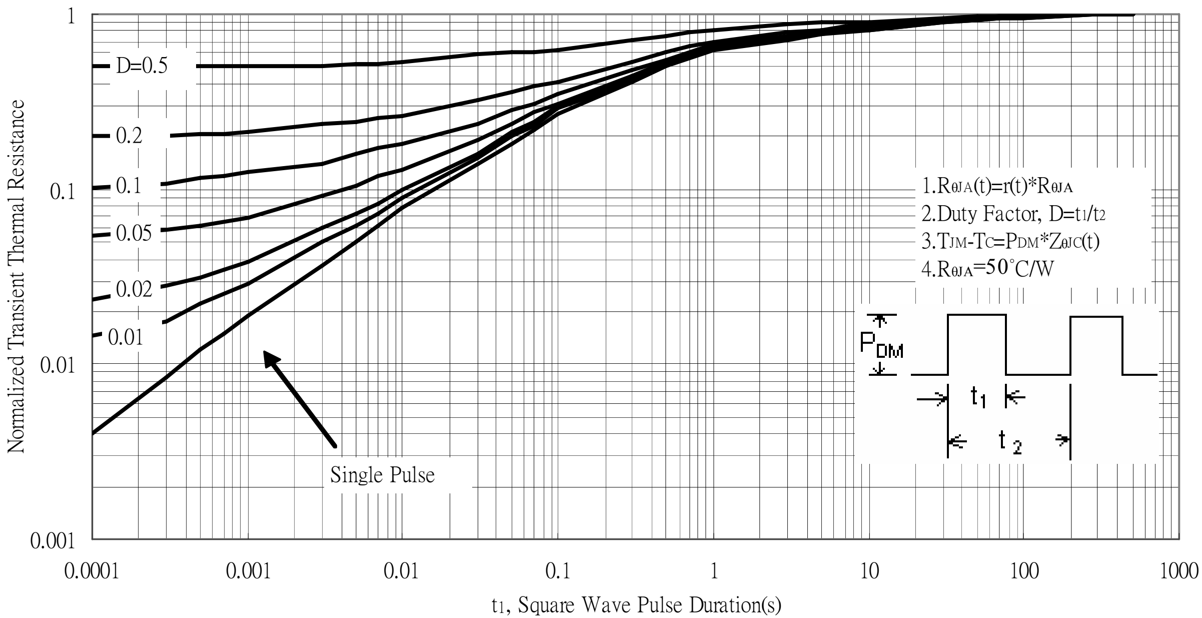




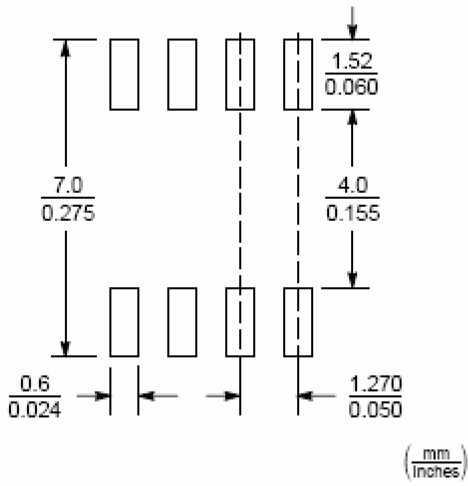
Typical Characteristics(Cont.) : Q2(P-channel)



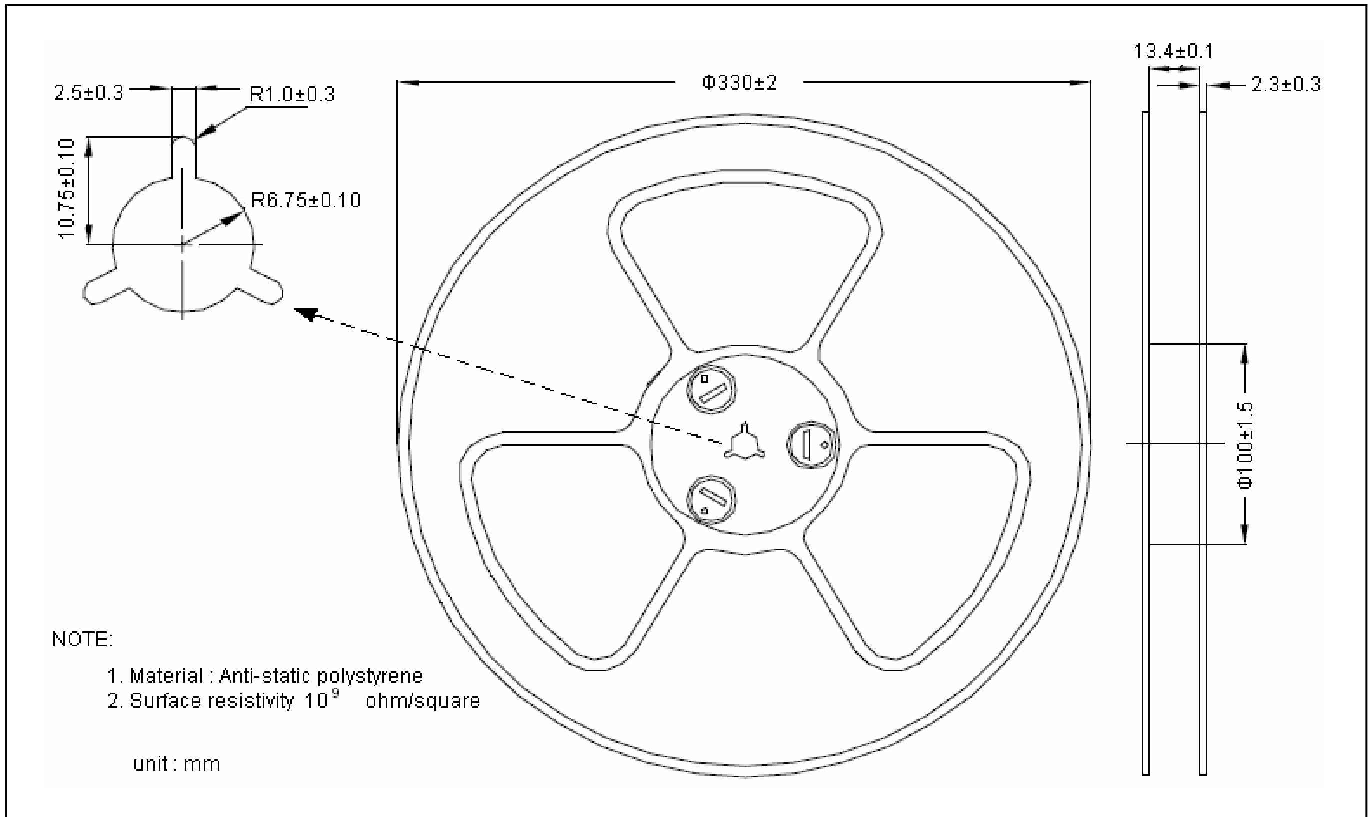




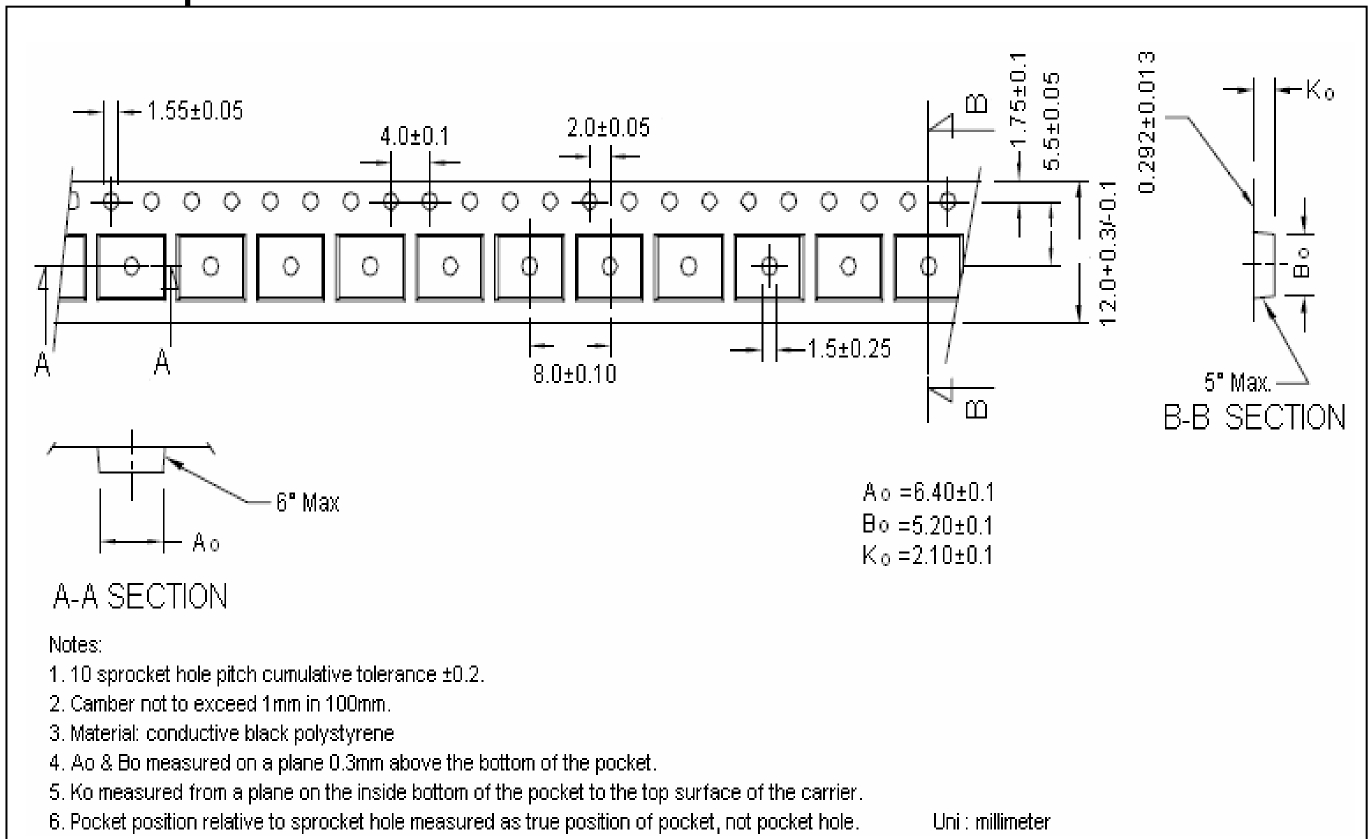
Recommended Soldering Footprint



Reel Dimension



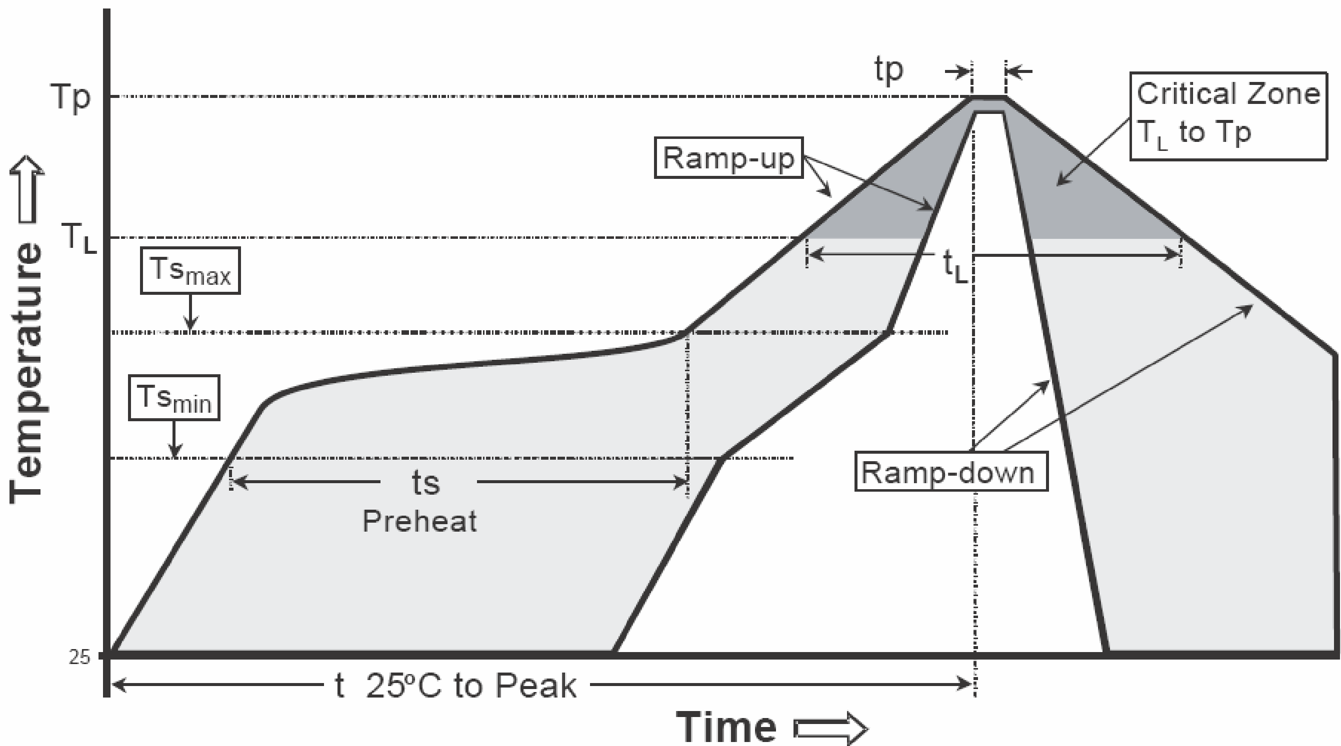
Carrier Tape Dimension



Recommended wave soldering condition

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

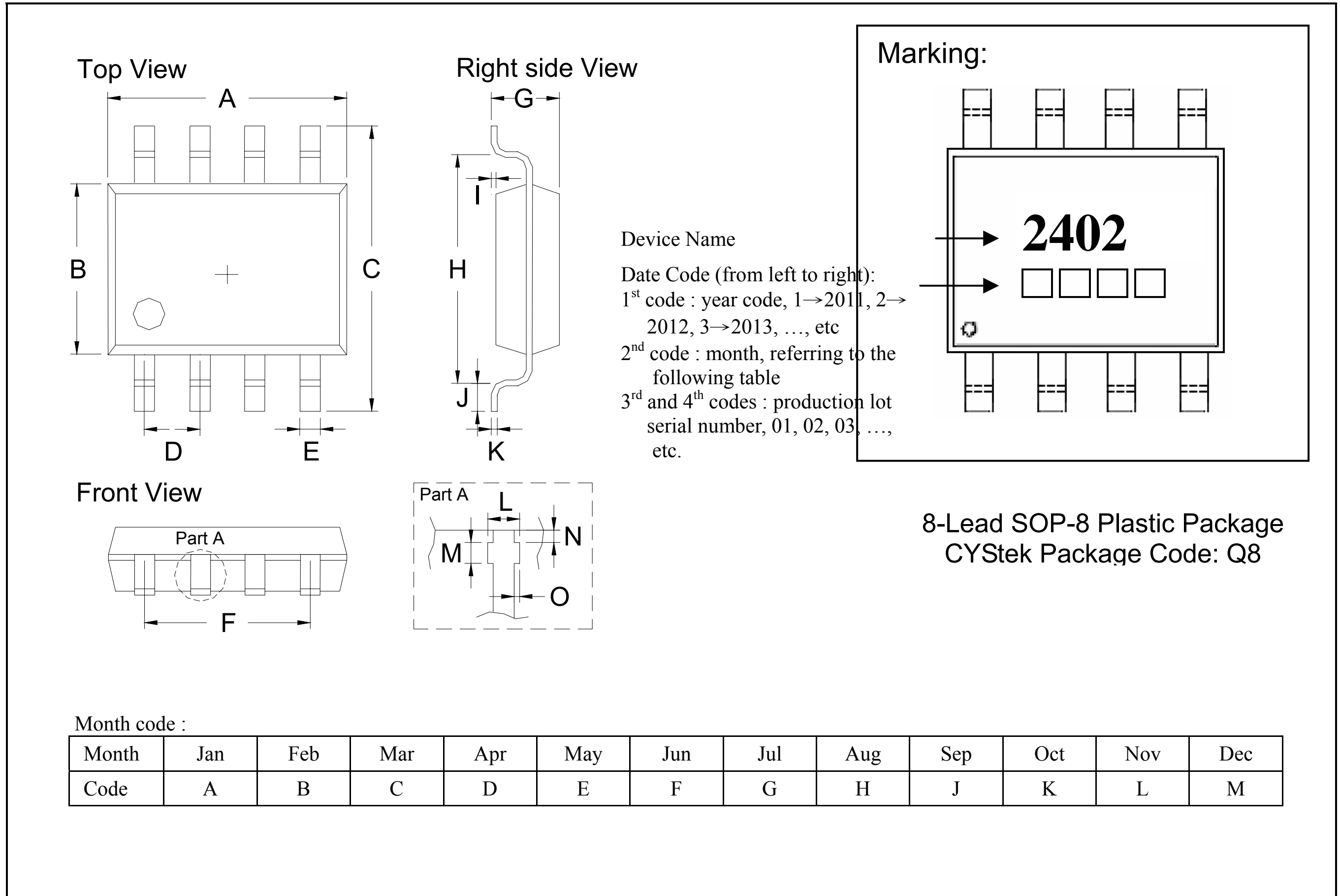
Recommended temperature profile for IR reflow



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



Month code :

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	A	B	C	D	E	F	G	H	J	K	L	M

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1909	0.2007	4.85	5.10	I	0.0019	0.0078	0.05	0.20
B	0.1515	0.1555	3.85	3.95	J	0.0118	0.0275	0.30	0.70
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	0.0145	0.0185	0.37	0.47	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	0.0570	0.0649	1.45	1.65	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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