N- AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

Description

The MTC5816AQ8 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.

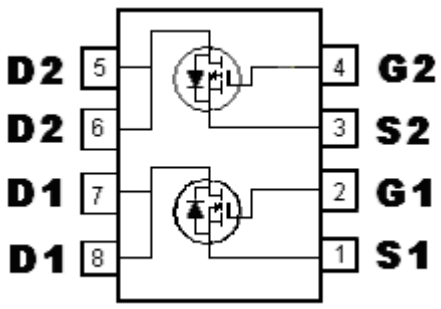
Features

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

	N-CH	P-CH
BV_{DSS}	60V	-60V
I_D@V_{GS}=10V(-10V), T_A=25°C	4.5A	-3.5A
R_{DSON}(typ.) @V_{GS}=(-)10V	37mΩ	70mΩ
R_{DSON}(typ.) @V_{GS}=(-)4.5V	42mΩ	93mΩ

Equivalent Circuit

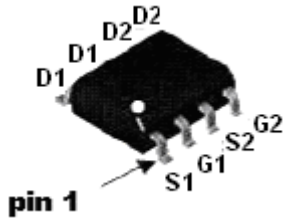
MTC5816AQ8



G：Gate　S：Source　D：Drain

Outline

SOP-8



Ordering Information

Device	Package	Shipping
MTC5816AQ8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 3000 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Breakdown Voltage	BV_{DSS}	60	-60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current @T_A=25 °C (Note 2)	I_D	4.5	-3.5	A
Continuous Drain Current @T_A=70 °C (Note 2)	I_D	3.6	-2.8	A
Pulsed Drain Current (Note 1)	I_{DM}	20	-20	A
Power Dissipation for Dual Operation	P_D	2		W
Power Dissipation for Single Operation		1.6 (Note 2)		
		0.9 (Note 3)		
Operating Junction and Storage Temperature Range	Tj; Tstg	-55~+150		°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	40	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	78 (Note 2)	°C/W
		135 (Note 3)	°C/W

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

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

Symbol **Static**	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	60	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	1.0	1.7	2.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=48V, V_{GS}=0
	-	-	10		V_{DS}=40V, V_{GS}=0, Tj=55°C
*$R_{DS(ON)}$	-	37	58	mΩ	V_{GS}=10V, I_D=4.5A
	-	42	60		V_{GS}=4.5V, I_D=4A
*G_{FS}	-	6	-	S	V_{DS}=10V, I_D=4.5A
Dynamic					
Ciss	-	1173	-	pF	V_{DS}=25V, V_{GS}=0, f=1MHz
Coss	-	45	-		
Crss	-	35	-		
*$t_{d(ON)}$	-	8	20	ns	V_{DS}=30V, I_D=1A, V_{GS}=10V, R_G=6Ω
*t_r	-	12	18		
*$t_{d(OFF)}$	-	30	35		
*t_f	-	7	15		

*Qg	-	14	16	nC	V_{DS}=30V, I_D=4.5A, V_{GS}=10V
*Qgs	-	3.9	-		
*Qgd	-	4.7	-		
Source-Drain Diode					
*V_{SD}	-	0.75	1.0	V	V_{GS}=0V, I_S=1.3A
*I_S	-	-	1.3	A	
*I_{SM}	-	-	2.6	A	

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

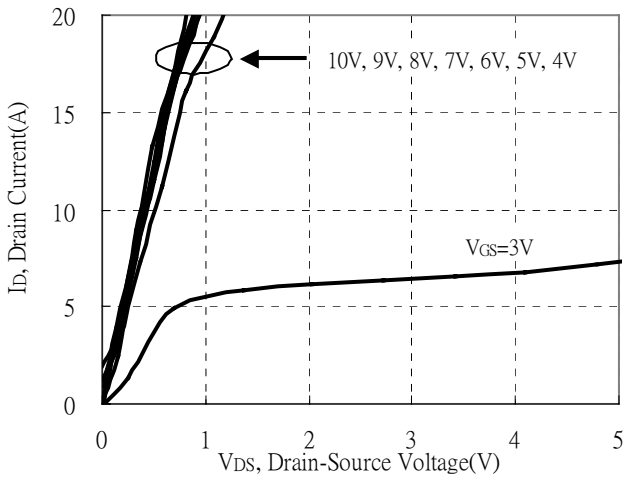
P-Channel Electrical Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-60	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-1.0	-1.8	-2.5	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	-1	μA	V_{DS}=-48V, V_{GS}=0
	-	-	-10		V_{DS}=-40V, V_{GS}=0, Tj=55°C
*$R_{DS(ON)}$	-	70	90	mΩ	V_{GS}=-10V, I_D=-3.5A
	-	93	125		V_{GS}=-4.5V, I_D=-3A
*G_{FS}	-	5	-	S	V_{DS}=-10V, I_D=-3.5A
Dynamic					
Ciss	-	940	-	pF	V_{DS}=-30V, V_{GS}=0, f=1MHz
Coss	-	49	-		
Crss	-	35	-		
*$t_{d(ON)}$	-	6	13	ns	V_{DS}=-30V, I_D=-1A, V_{GS}=-10V, R_G=6Ω
*t_r	-	8	18	ns	
*$t_{d(OFF)}$	-	26	31		
*t_f	-	11	20		
*Qg	-	10	15	nC	V_{DS}=-30V, I_D=-3.5A, V_{GS}=-10V
*Qgs	-	3	-		
*Qgd	-	3.1	-		
Source-Drain Diode					
*V_{SD}	-	-0.75	-1.0	V	V_{GS}=0V, I_S=-1.3A
*I_S	-	-	-1.3	A	
*I_{SM}	-	-	-2.6		

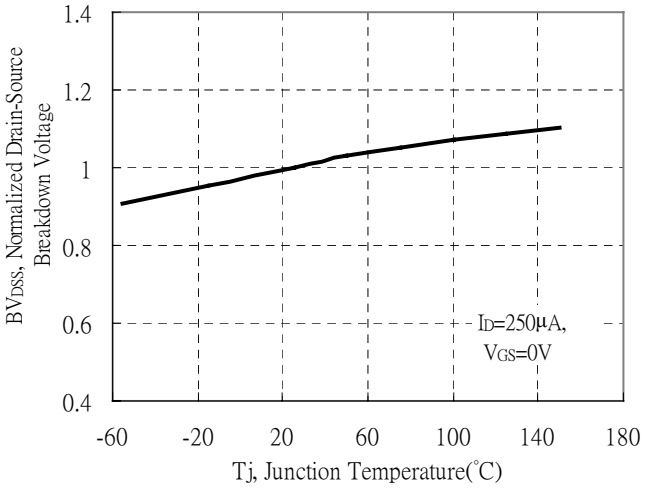
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics : Q1(N-channel)

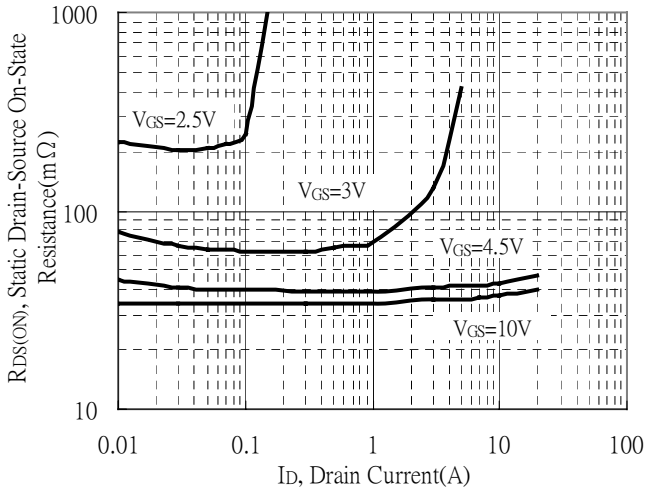
Typical Output Characteristics



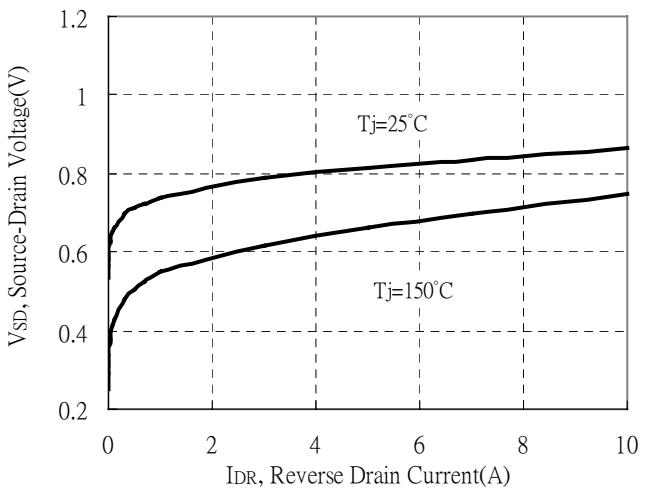
Brekdown Voltage vs Ambient Temperature



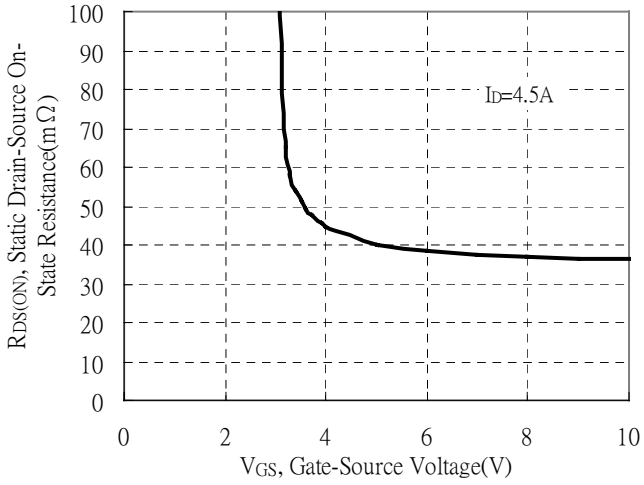
Static Drain-Source On-State resistance vs Drain Current



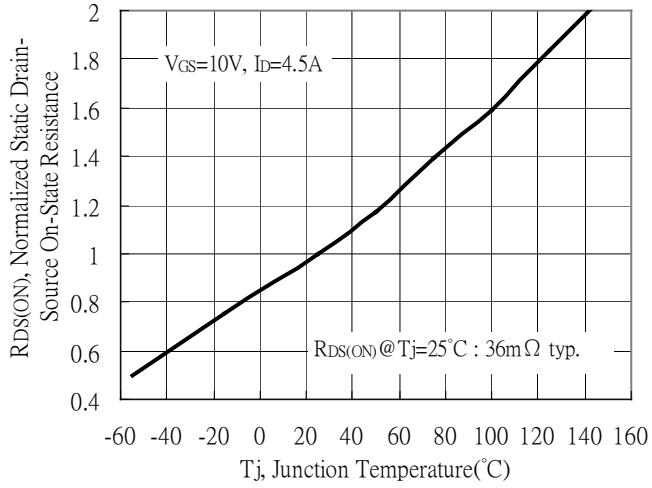
Reverse Drain Current vs Source-Drain Voltage



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

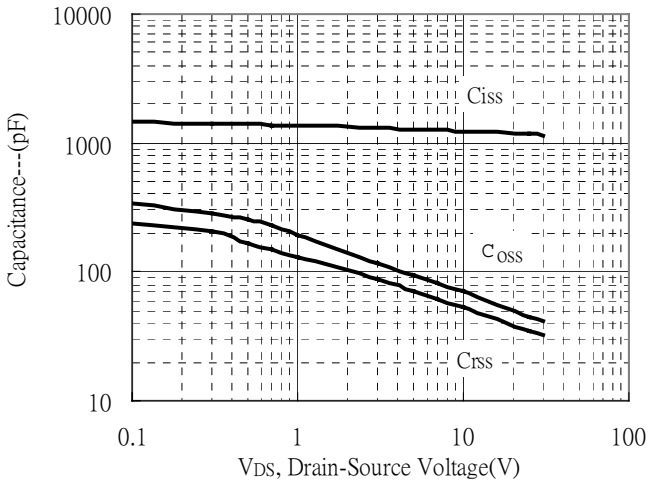


Drain-Source On-State Resistance vs Junction Tempearture

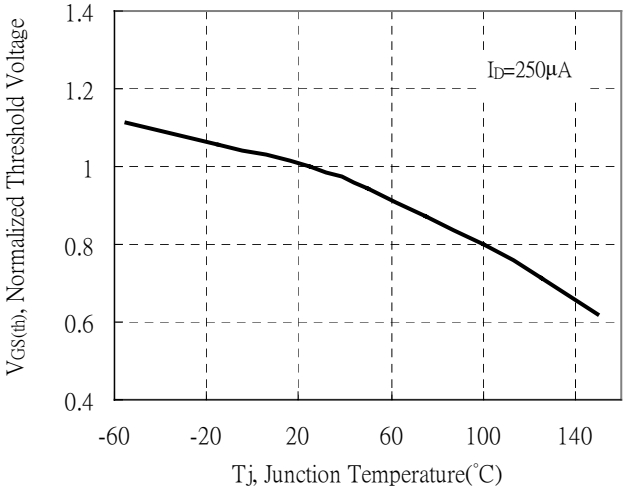


Typical Characteristics(Cont.) : Q1(N-channel)

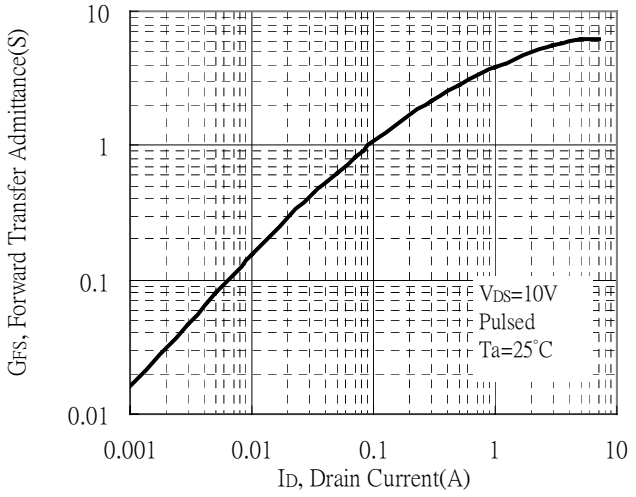
Capacitance vs Drain-to-Source Voltage



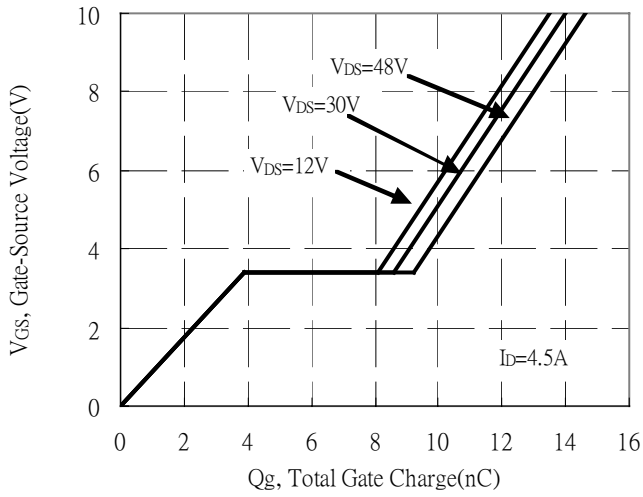
Threshold Voltage vs Junction Tempearture



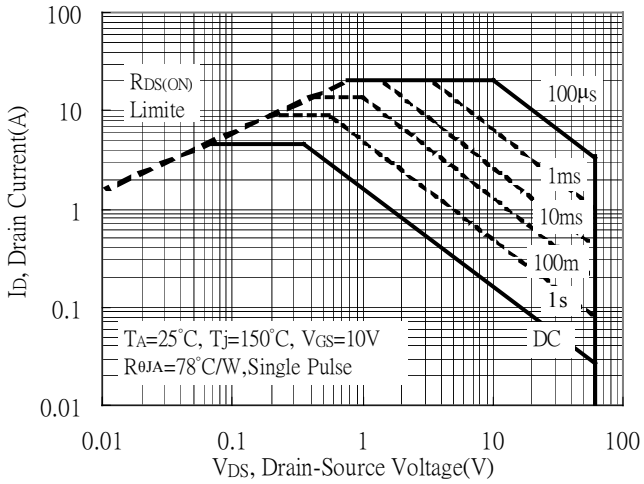
Forward Transfer Admittance vs Drain Current



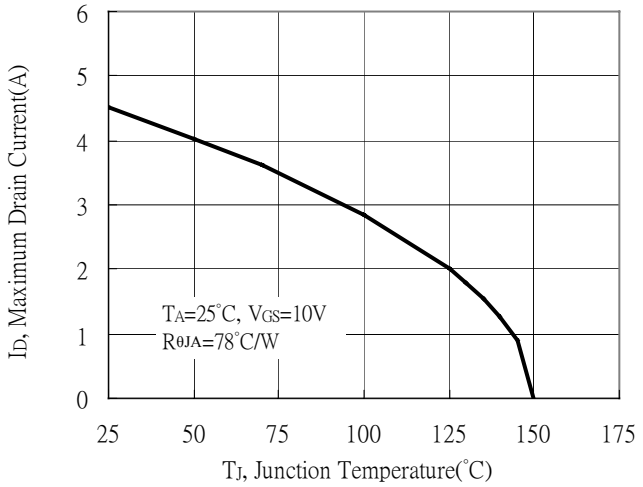
Gate Charge Characteristics



Maximum Safe Operating Area

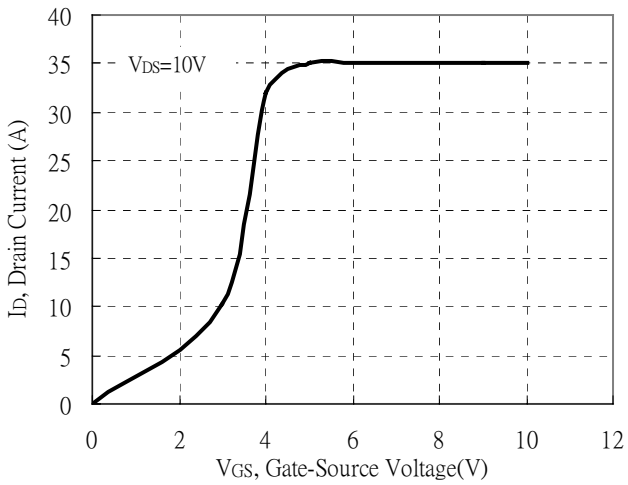


Maximum Drain Current vs Junction Temperature

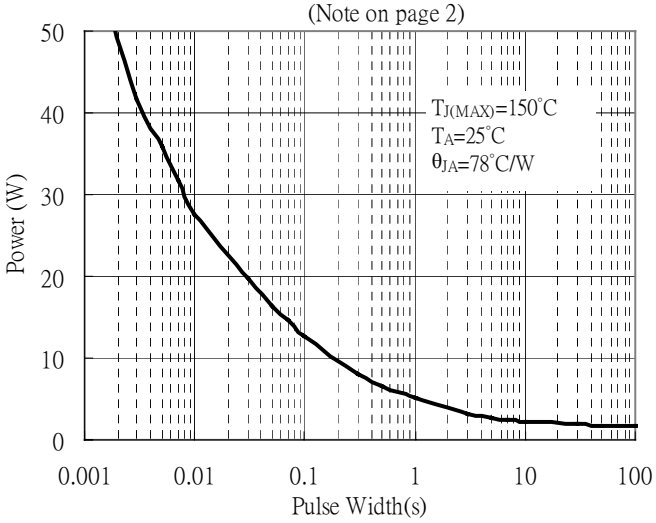


Typical Characteristics(Cont.) : Q1(N-channel)

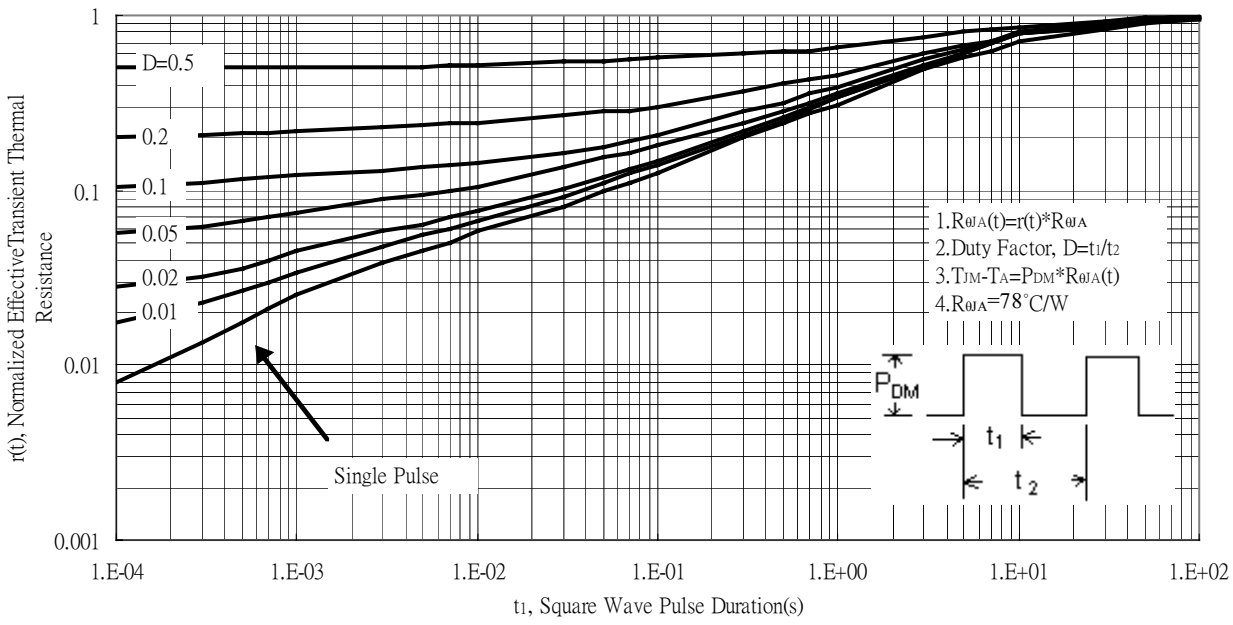
Typical Transfer Characteristics



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

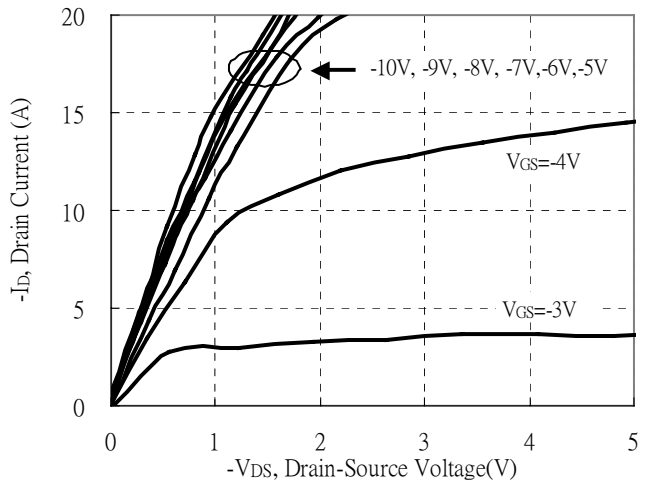


Transient Thermal Response Curves

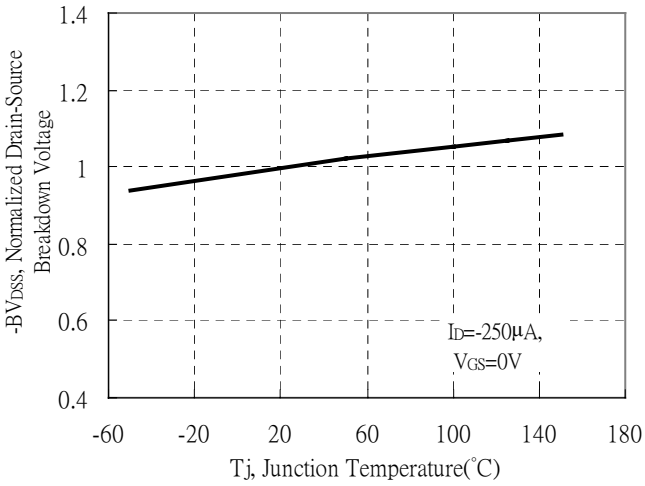


Typical Characteristics : Q2(P-channel)

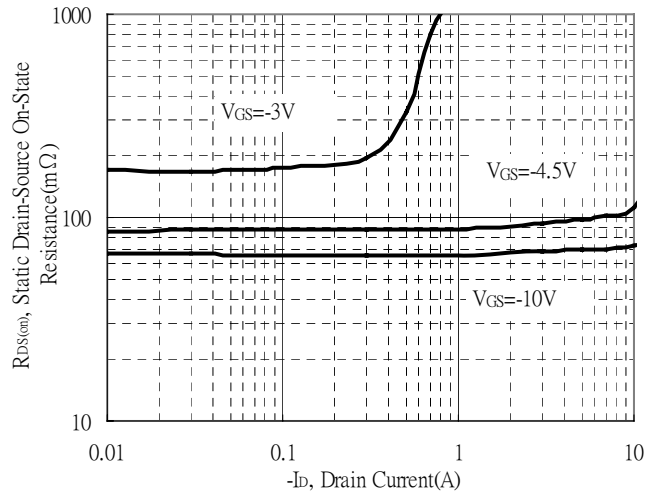
Typical Output Characteristics



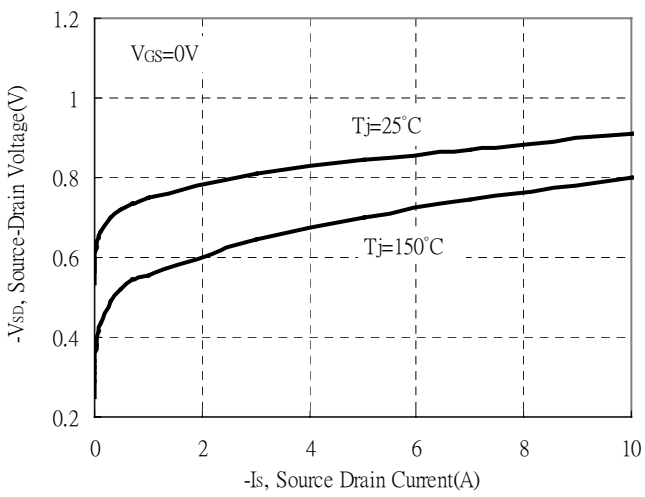
Brekdown Voltage vs Ambient Temperature



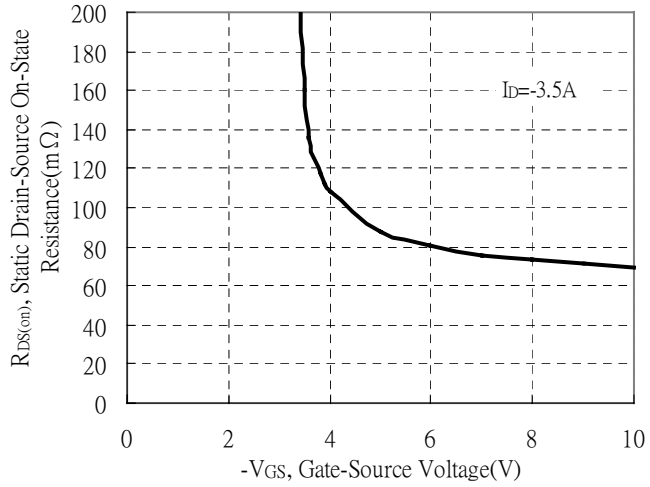
Static Drain-Source On-State resistance vs Drain Current



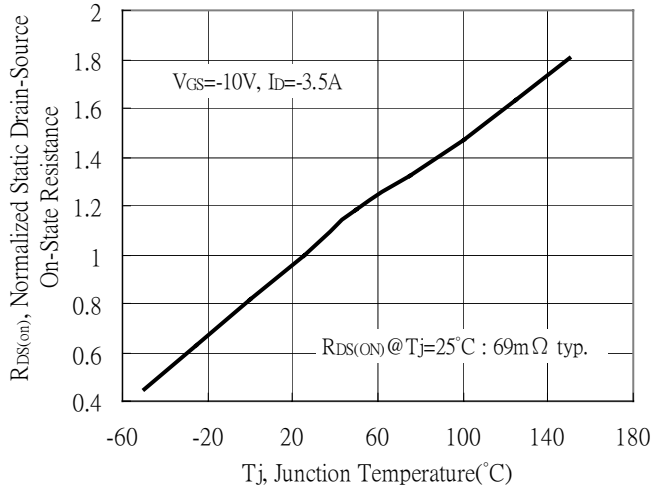
Source Drain Current vs Source-Drain Voltage



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

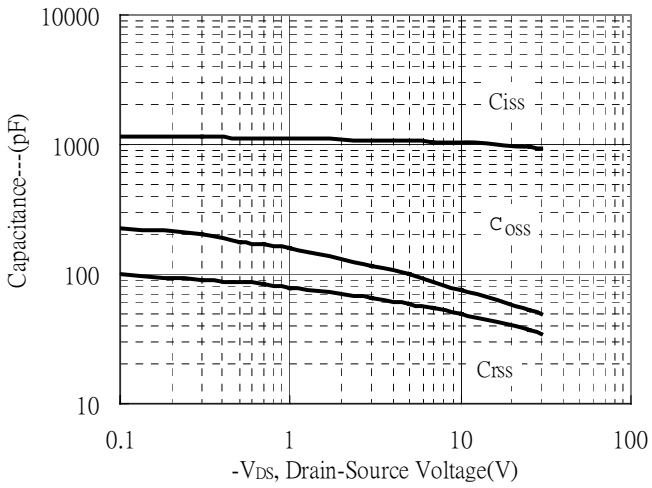


Drain-Source On-State Resistance vs Junction Tempearture

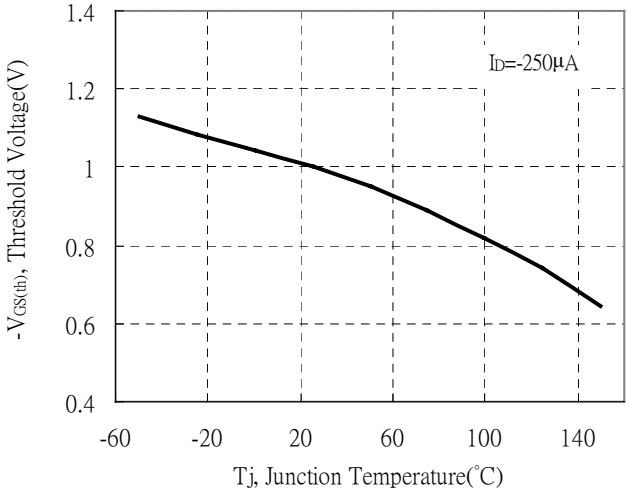


Typical Characteristics(Cont.) : Q2(P-channel)

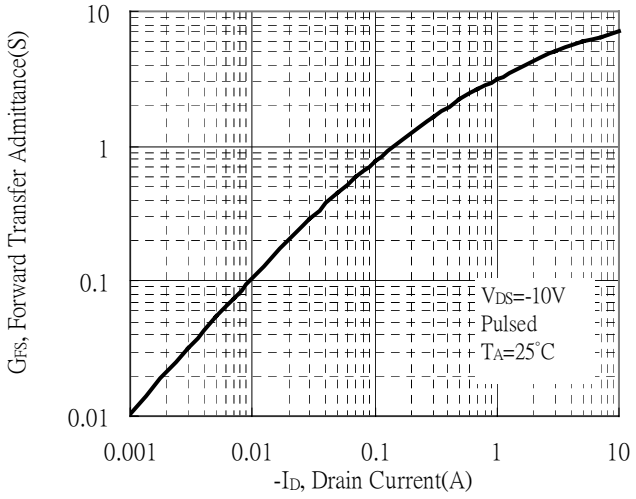
Capacitance vs Drain-to-Source Voltage



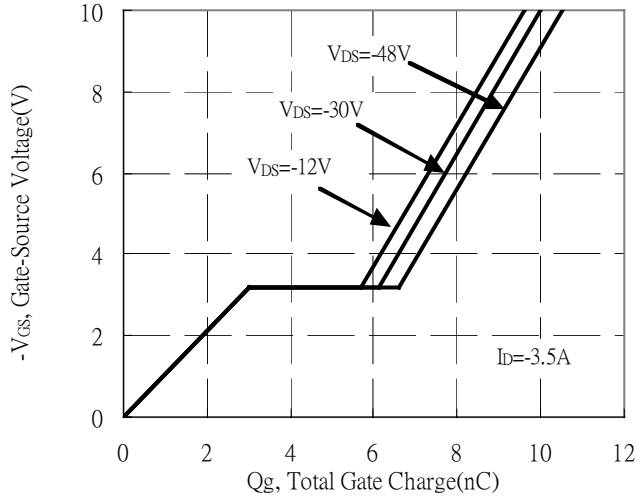
Threshold Voltage vs Junction Tempearture



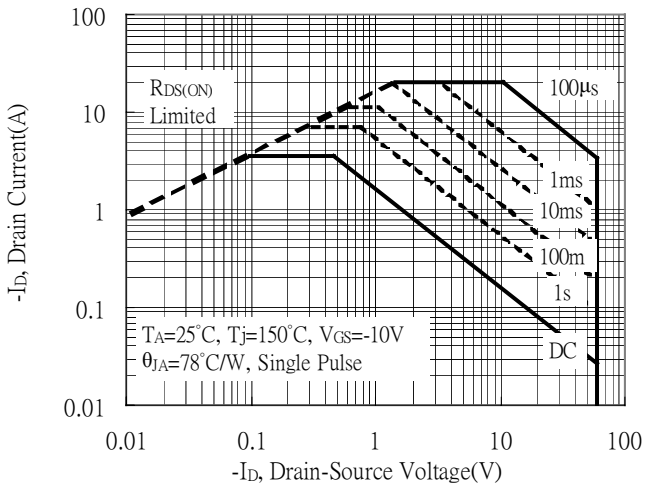
Forward Transfer Admittance vs Drain Current



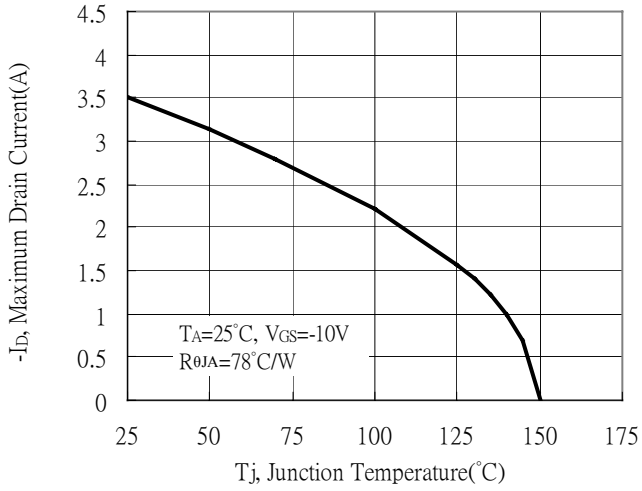
Gate Charge Characteristics



Maximum Safe Operating Area

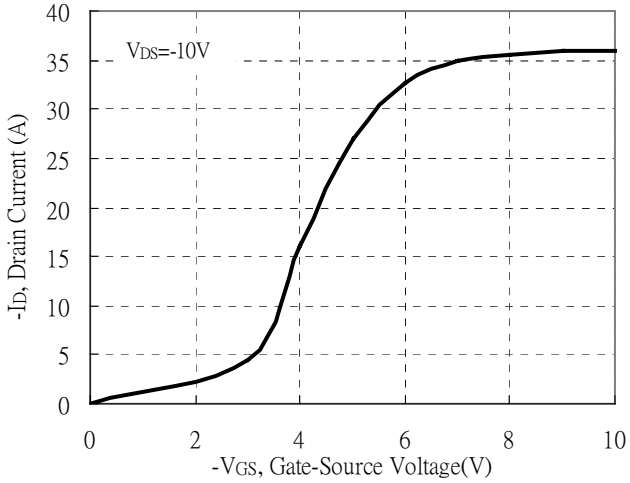


Maximum Drain Current vs Junction Temperature

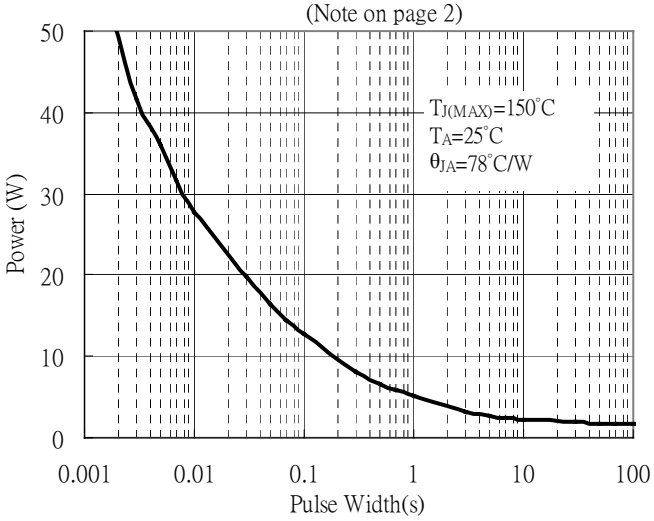


Typical Characteristics(Cont.) : Q2(P-channel)

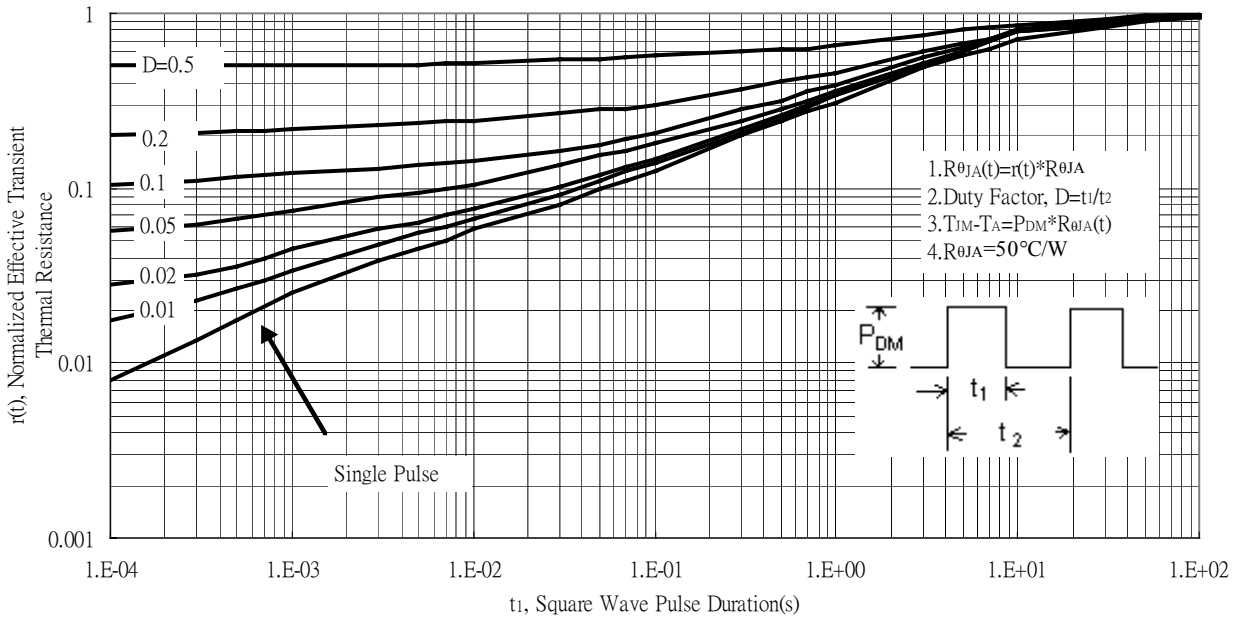
Typical Transfer Characteristics



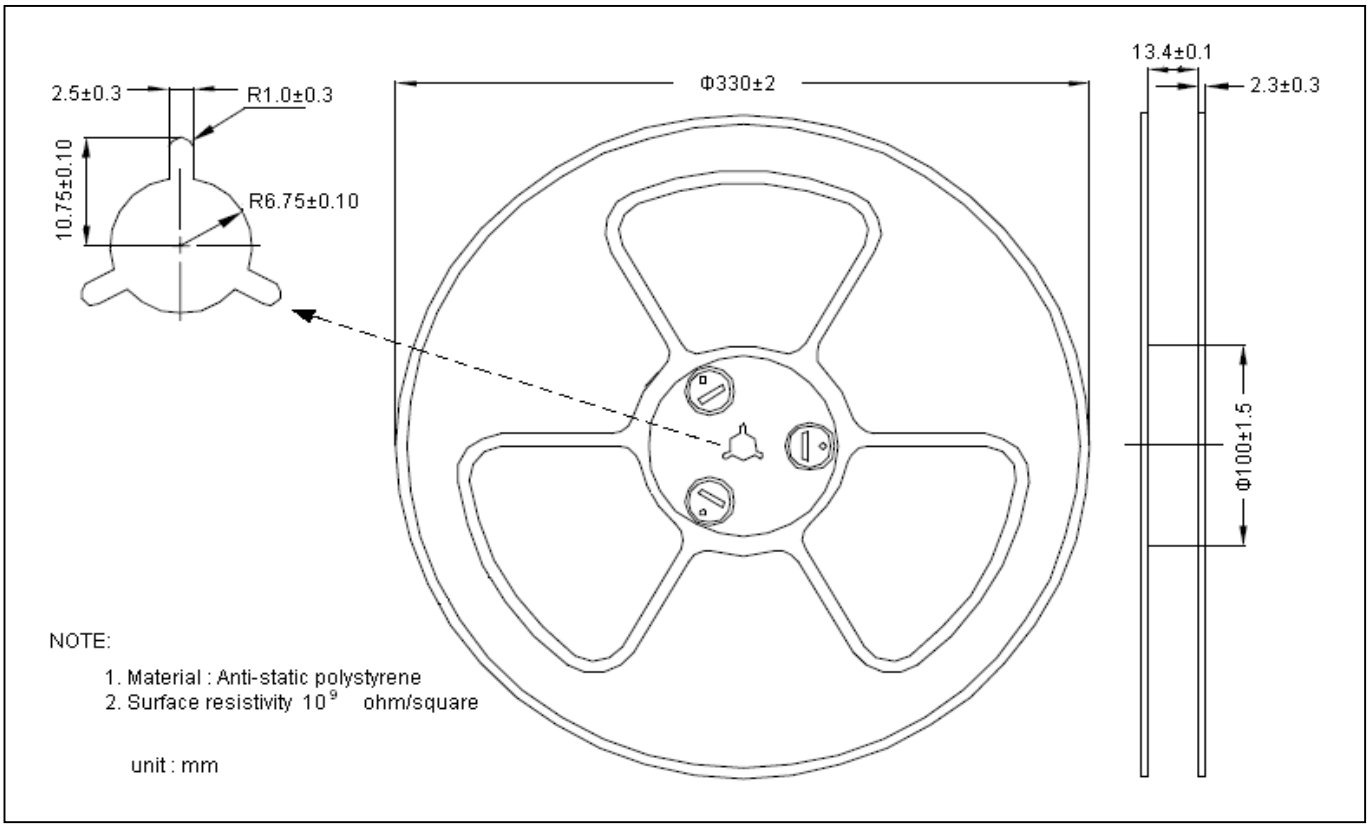
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



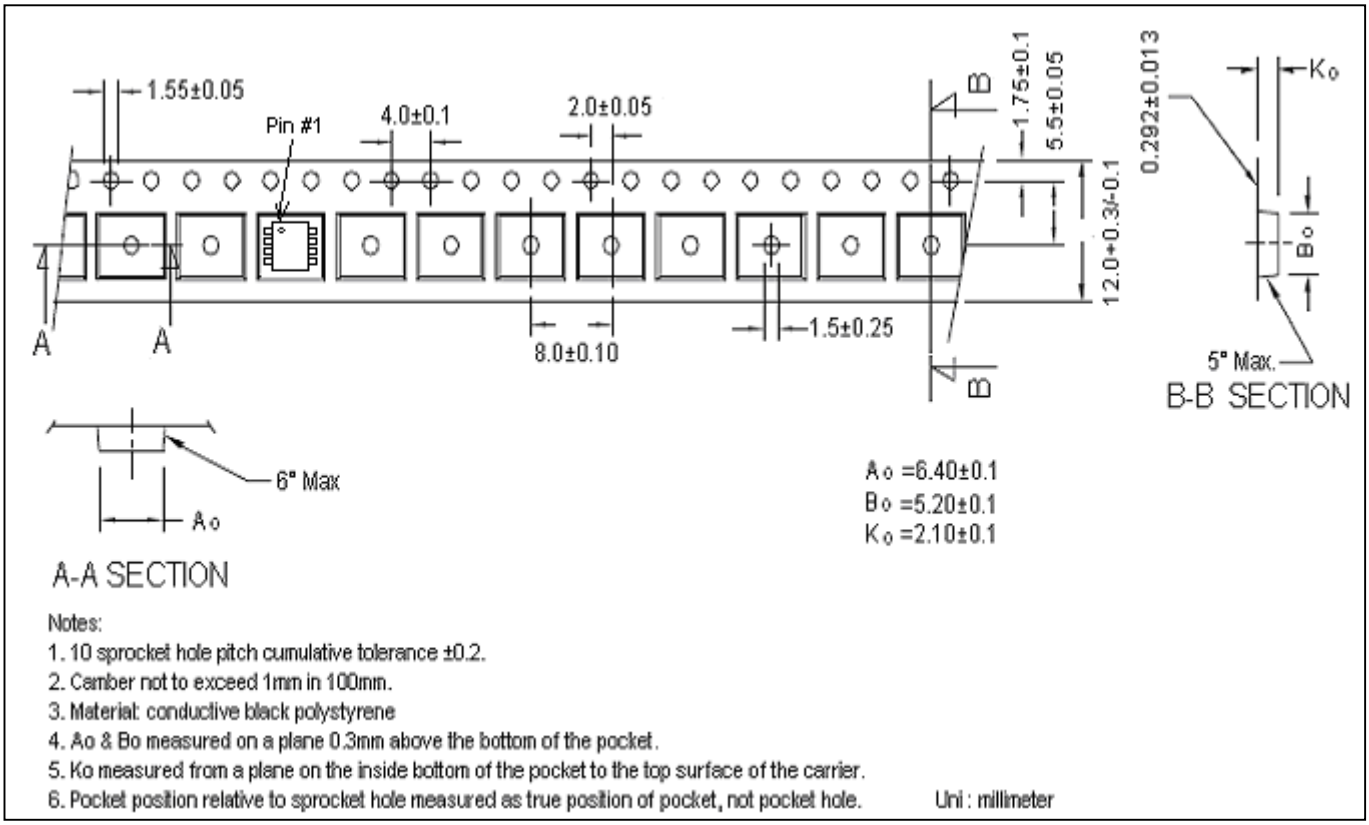
Transient Thermal Response Curves



Reel Dimension



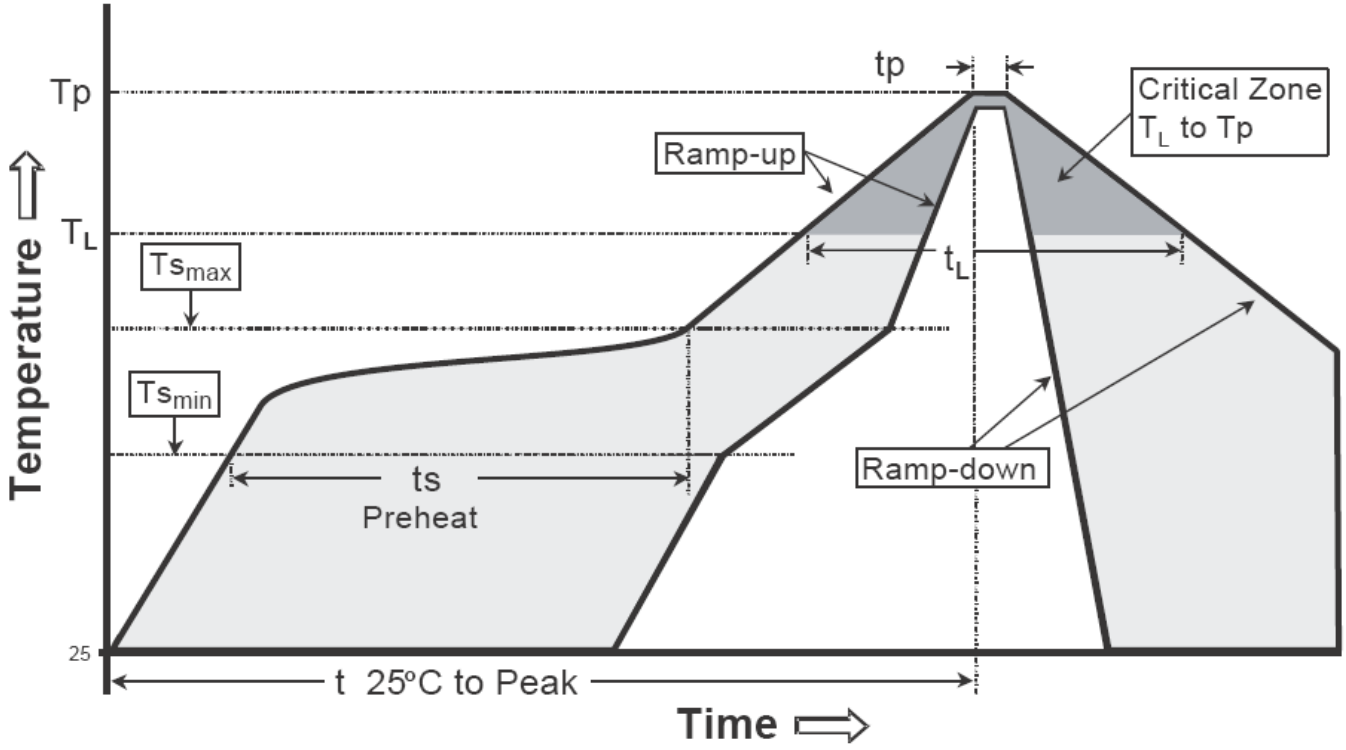
Carrier Tape Dimension



Recommended wave soldering condition

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

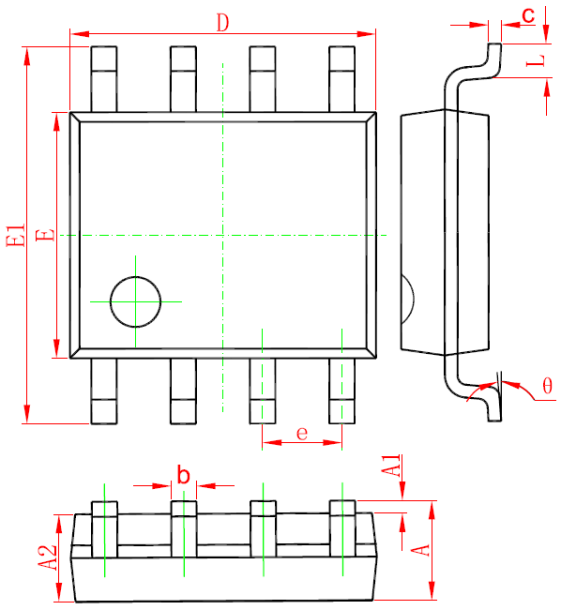
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (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.

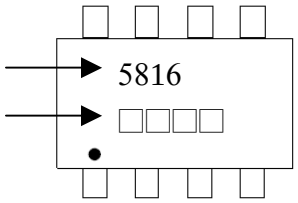
SOP-8 Dimension



Marking:

Device Name

Date Code



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

*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069	E	3.800	4.000	0.150	0.157
A1	0.100	0.250	0.004	0.010	E1	5.800	6.200	0.228	0.244
A2	1.350	1.550	0.053	0.061	e	*1.270		*0.050	
b	0.330	0.510	0.013	0.020	L	0.400	1.270	0.016	0.050
c	0.170	0.250	0.006	0.010	θ	0°	8°	0°	8°
D	4.700	5.100	0.185	0.200					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.