

N- AND P-Channel Logic Level Enhancement Mode MOSFET

MTBA5C10AQ8

	N-CH	P-CH
BV_{DSS}	100V	-100V
I_D	2.4A	-2.2A
$R_{DS(on)(MAX.)}$	150m Ω	220m Ω

Description

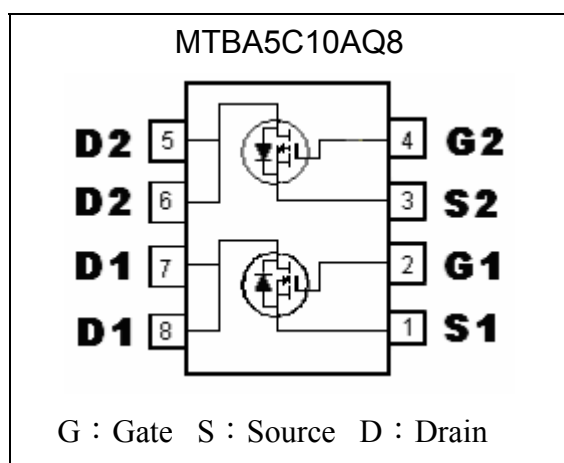
The MTBA5C10AQ8 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single SOP-8 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The SOP-8 package is universally preferred for all commercial-industrial surface mount applications.

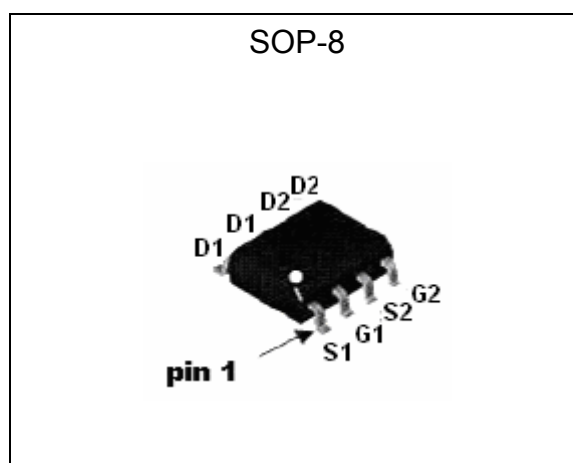
Features

- 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
MTBA5C10AQ8-0-T3-G	SOP-8 (Pb-free lead plating & halogen-free package)	2500 pcs / Tape & Reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products
Packing spec, T3 : 2500 pcs / tape & reel, 13" reel
Product rank, zero for no rank products
Product name

**Absolute Maximum Ratings** ($T_C=25^{\circ}\text{C}$, unless otherwise noted)

Parameter		Symbol	Limits		Unit
			N-channel	P-channel	
Drain-Source Breakdown Voltage		BV _{DSS}	100	-100	V
Gate-Source Voltage		V _{GS}	±20	±20	
Continuous Drain Current (Note 2)	T _A =25 °C, V _{GS} =10V (-10V)	I _D	2.4	-2.2	A
	T _A =100 °C, V _{GS} =10V (-10V)		1.5	-1.4	
Pulsed Drain Current (Note 1)		I _{DM}	12	-10	
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		T _j ; T _{stg}	-55~+150		°C

Thermal Data

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

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

N-Channel Electrical Characteristics ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	100	-	-	V	$V_{GS}=0$, $I_D=250\mu\text{A}$
$V_{GS(th)}$	1.0	1.8	3.0	V	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$
I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0$
I_{DSS}	-	-	1	μA	$V_{DS}=80\text{V}$, $V_{GS}=0$
	-	-	25	μA	$V_{DS}=70\text{V}$, $V_{GS}=0$, $T_j=125^{\circ}\text{C}$
$*R_{DS(ON)}$	-	121	150	m Ω	$I_D=2.4\text{A}$, $V_{GS}=10\text{V}$
	-	125	160		$I_D=2\text{A}$, $V_{GS}=5\text{V}$
$*G_{FS}$	-	8	-	S	$V_{DS}=5\text{V}$, $I_D=2.4\text{A}$
Dynamic					
C_{iss}	-	1237	-	pF	$V_{DS}=20\text{V}$, $V_{GS}=0$, $f=1\text{MHz}$
C_{oss}	-	38	-		
C_{rss}	-	27	-		
$*t_{d(ON)}$	-	13	-	ns	$V_{DS}=50\text{V}$, $I_D=1\text{A}$, $V_{GS}=10\text{V}$, $R_G=6\Omega$
$*t_r$	-	9	-		
$*t_{d(OFF)}$	-	36	-		
$*t_f$	-	9	-		
$*Q_g$	-	18	-	nC	$V_{DS}=80\text{V}$, $I_D=2.4\text{A}$, $V_{GS}=10\text{V}$
$*Q_{gs}$	-	4.2	-		
$*Q_{gd}$	-	3.6	-		



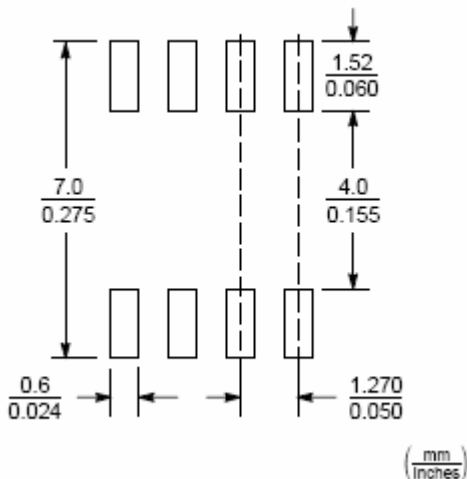
Body Diode					
*V _{SD}	-	-	1.3	V	V _{GS} =0V, I _S =2.4A
*I _S	-	-	2.4	A	
*I _{SM}	-	-	12		

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

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

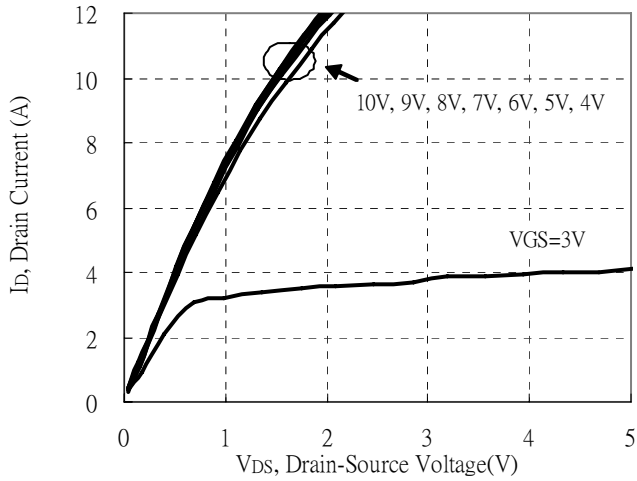
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-100	-	-	V	V _{GS} =0, I _D =-250μA
V _{GS(th)}	-1.0	-1.8	-3.0		V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0
I _{DSS}	-	-	-1	μA	V _{DS} =-80V, V _{GS} =0
	-	-	-25		V _{DS} =-70V, V _{GS} =0, T _J =125°C
*R _{DS(ON)}	-	167	220	mΩ	I _D =-1.5A, V _{GS} =-10V
	-	180	230		I _D =-1A, V _{GS} =-5V
*G _{FS}	-	5	-	S	V _{DS} =-5V, I _D =-1.5A
Dynamic					
C _{iss}	-	1406	-	pF	V _{DS} =-20V, V _{GS} =0, f=1MHz
C _{oss}	-	56	-		
C _{rss}	-	33	-		
*t _{d(ON)}	-	14	-	ns	V _{DS} =-50V, I _D =-1A, V _{GS} =-10V, R _G =6Ω
*t _r	-	10	-		
*t _{d(OFF)}	-	37	-		
*t _f	-	10	-		
*Q _g	-	20	-	nC	V _{DS} =-80V, I _D =-2.2A, V _{GS} =-10V
*Q _{gs}	-	4.4	-		
*Q _{gd}	-	4.3	-		
Body Diode					
*V _{SD}	-	-	-1.3	V	V _{GS} =0V, I _S =-2.2A
*I _S	-	-	-2.2	A	
*I _{SM}	-	-	-10		

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

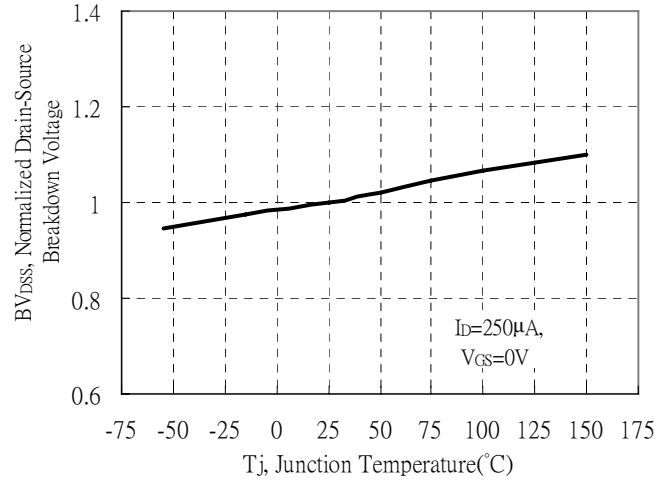
Recommended Soldering Footprint

Typical Characteristics : Q1(N-channel)

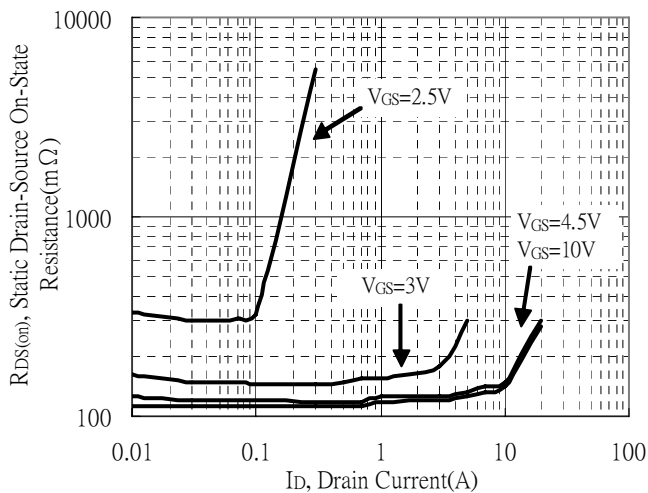
Typical Output Characteristics



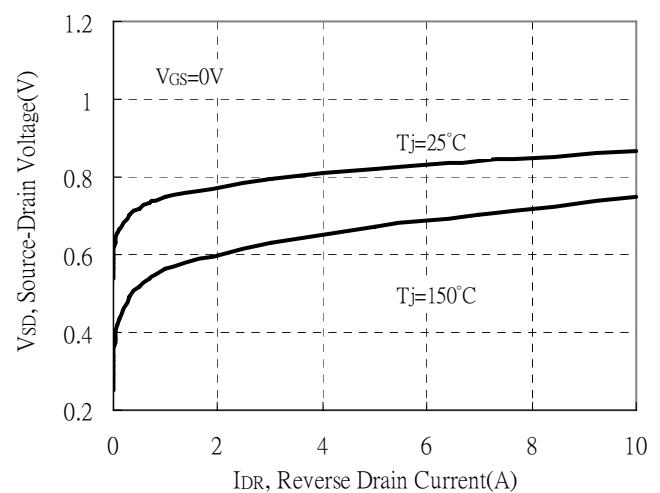
Brekdown Voltage vs Ambient Temperature



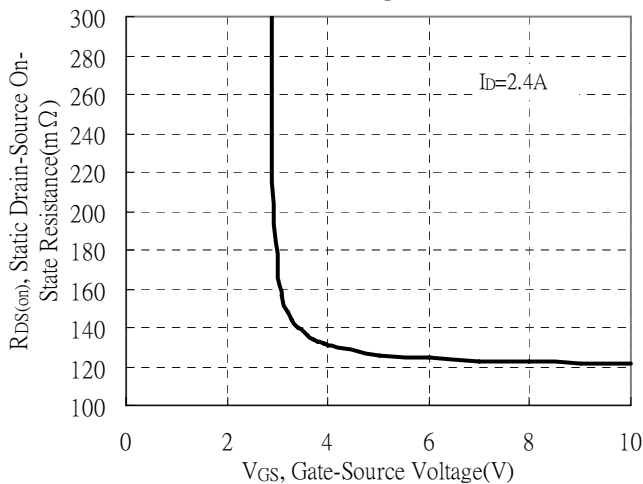
Static Drain-Source On-State resistance vs Drain Current



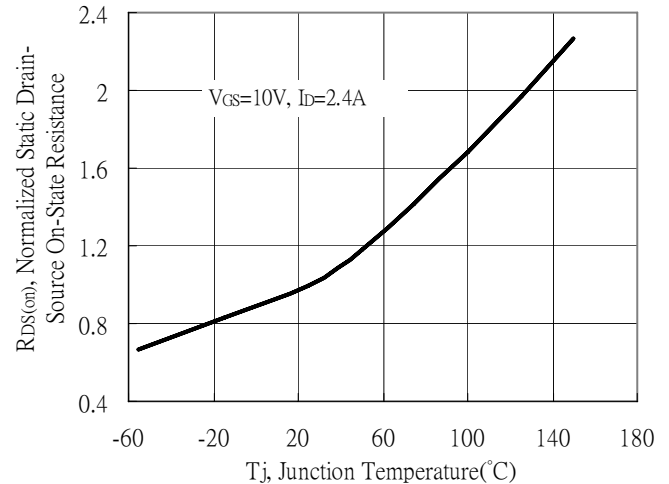
Reverse Drain Current vs Source-Drain Voltage



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

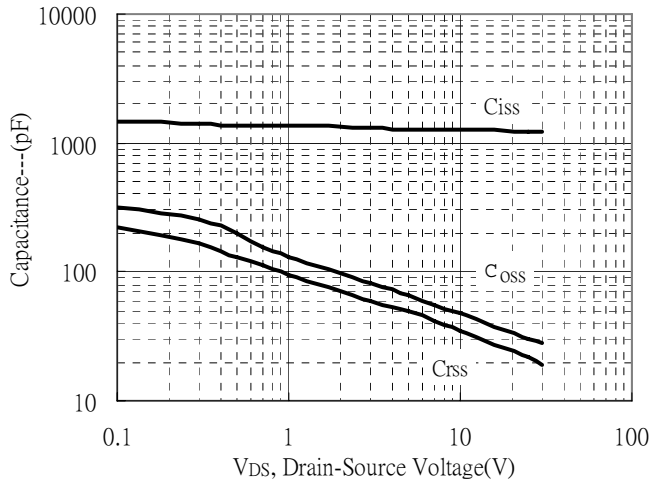


Drain-Source On-State Resistance vs Junction Temperature

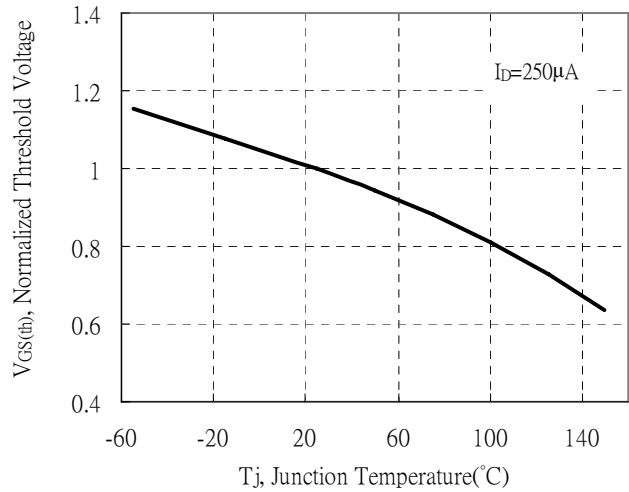


Typical Characteristics(Cont.) : Q1(N-channel)

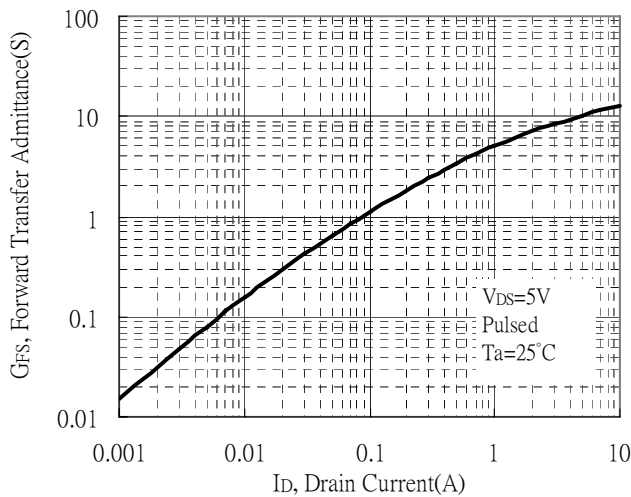
Capacitance vs Drain-to-Source Voltage



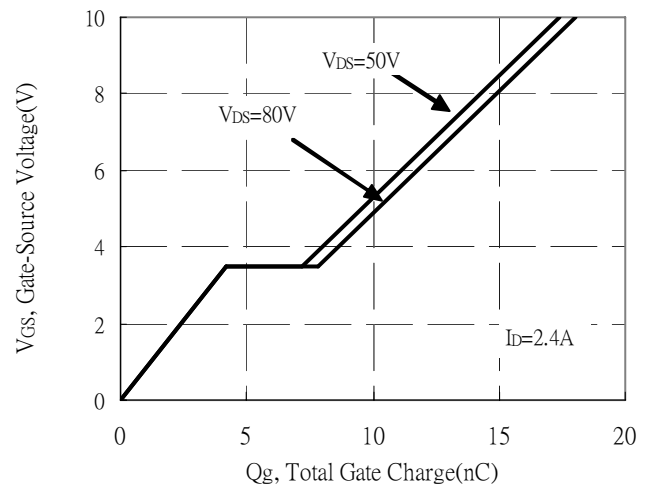
Threshold Voltage vs Junction Temperature



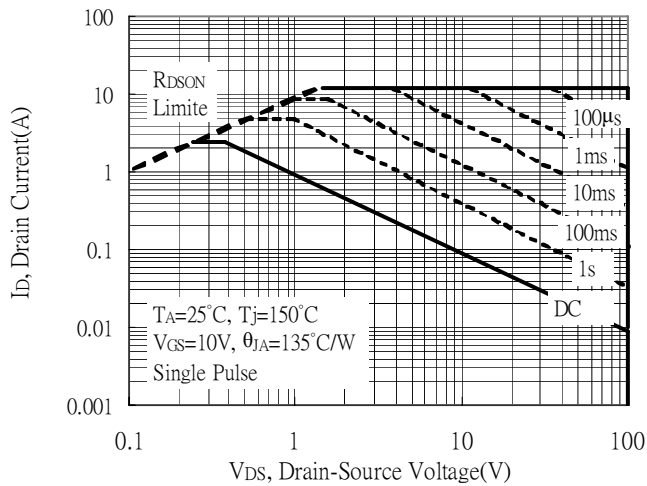
Forward Transfer Admittance vs Drain Current



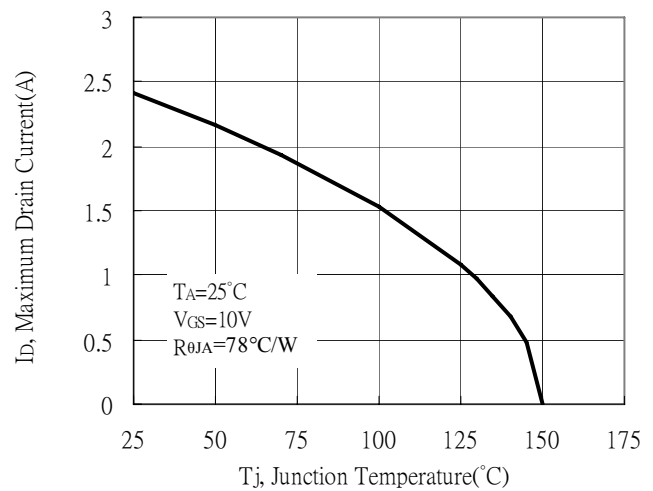
Gate Charge Characteristics



Maximum Safe Operating Area

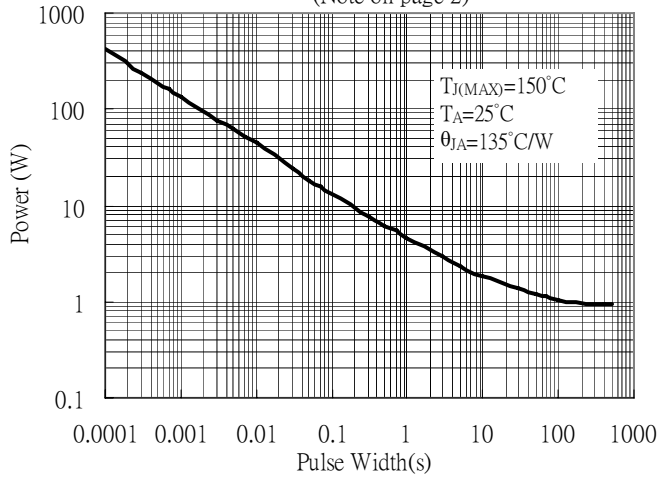


Maximum Drain Current vs Case Temperature

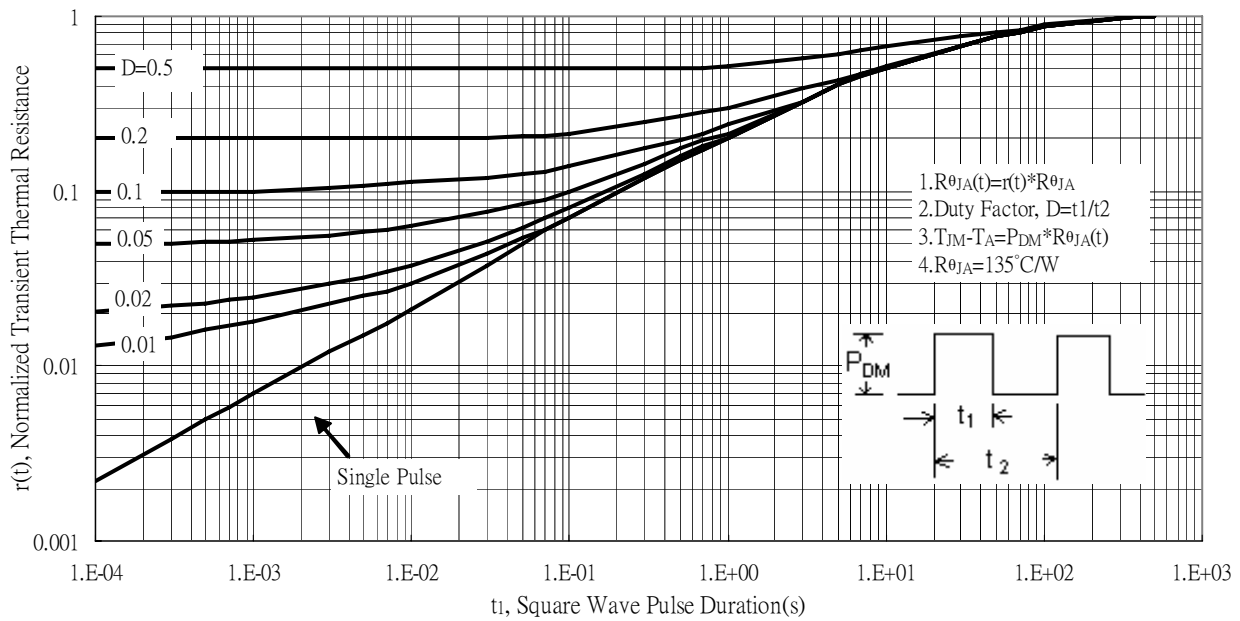


Typical Characteristics(Cont.) : Q1(N-channel)

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

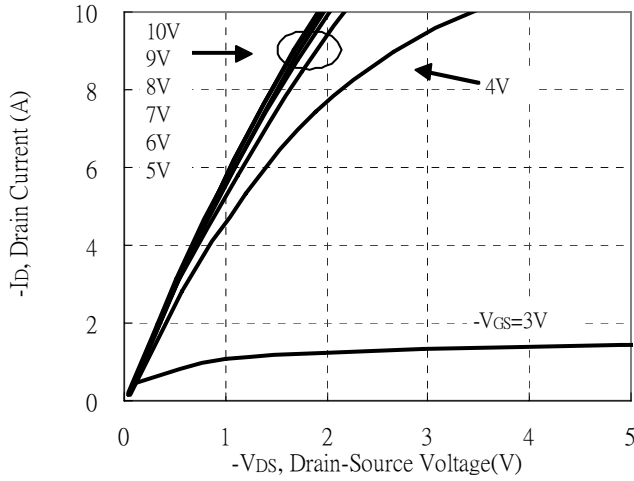


Transient Thermal Response Curves

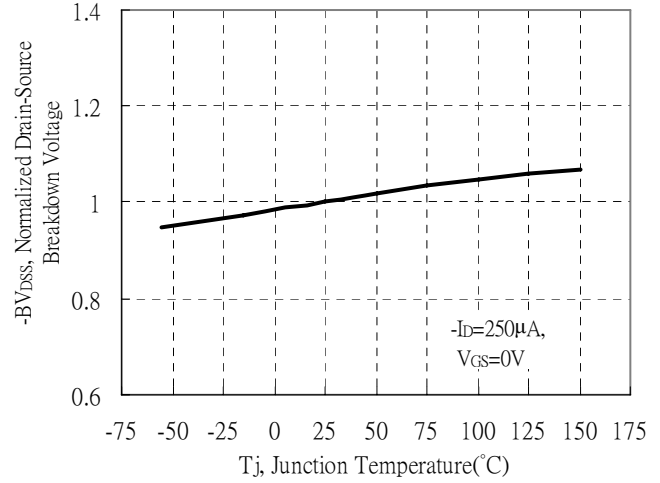


Typical Characteristics : Q2(P-channel)

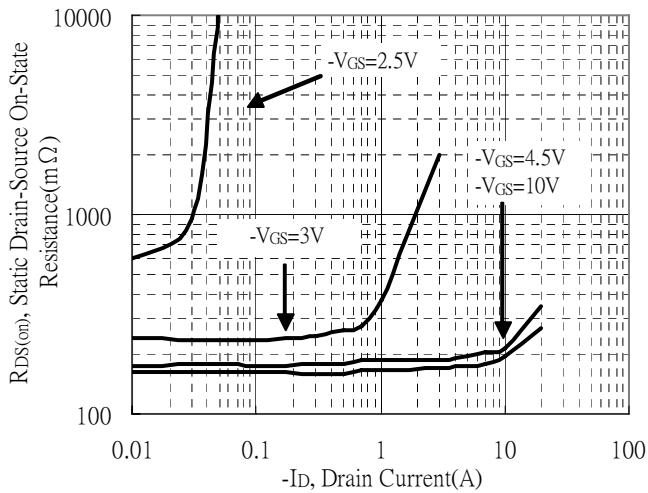
Typical Output Characteristics



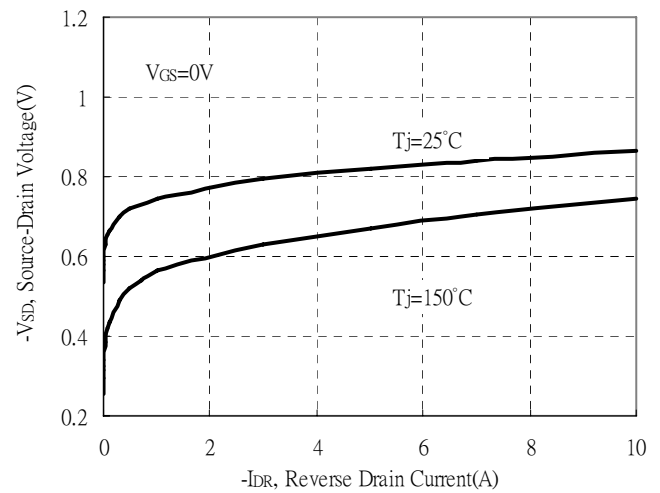
Breakdown Voltage vs Ambient Temperature



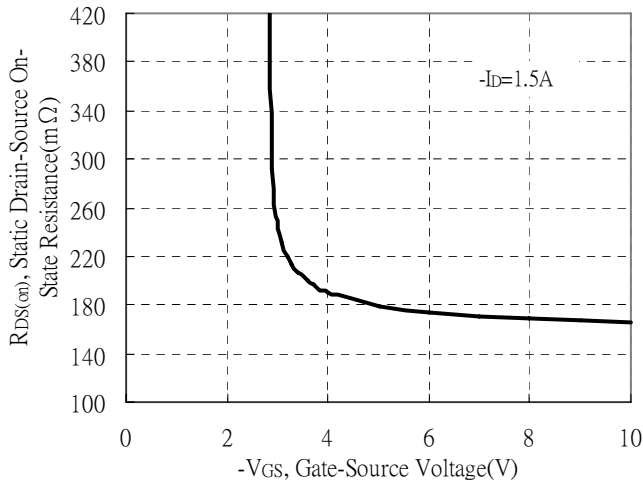
Static Drain-Source On-State resistance vs Drain Current



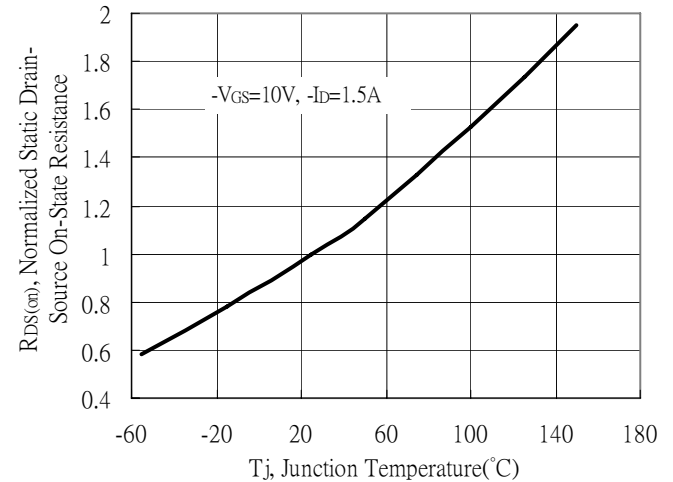
Reverse Drain Current vs Source-Drain Voltage



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

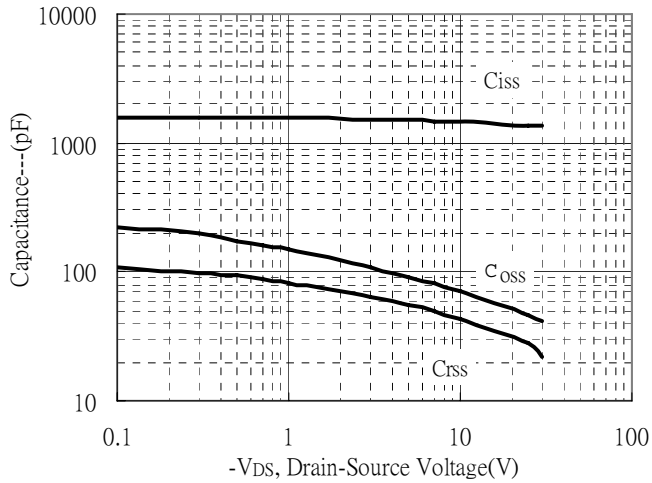


Drain-Source On-State Resistance vs Junction Temperature

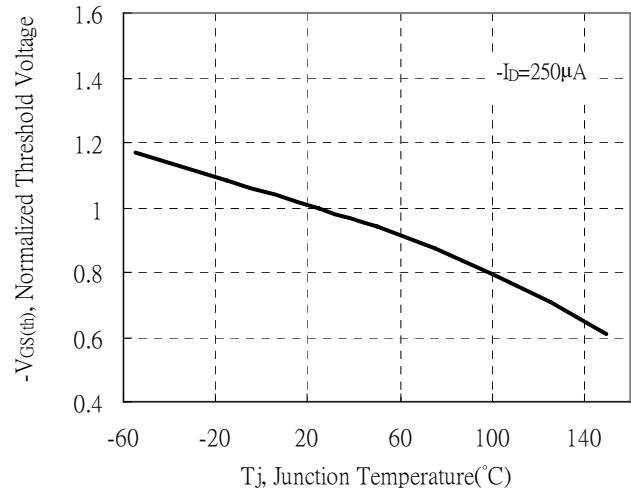


Typical Characteristics(Cont.) : Q2(P-channel)

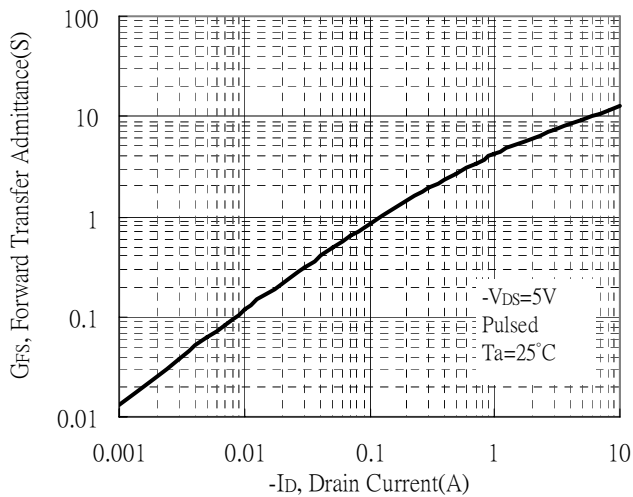
Capacitance vs Drain-to-Source Voltage



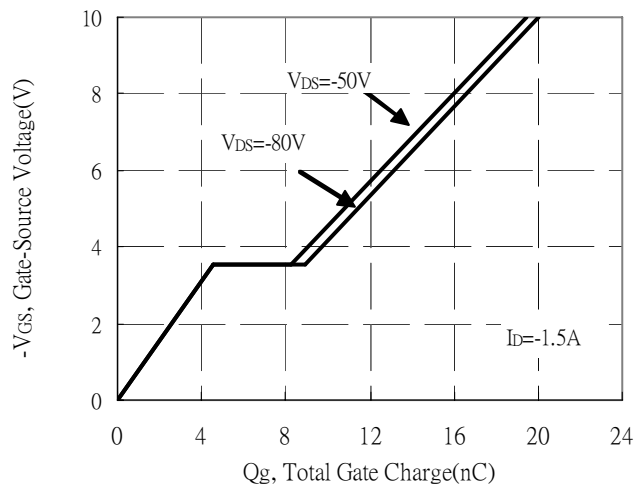
Threshold Voltage vs Junction Temperature



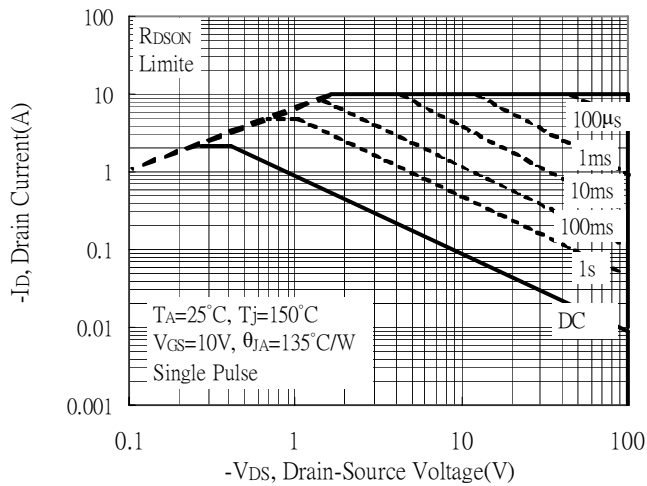
Forward Transfer Admittance vs Drain Current



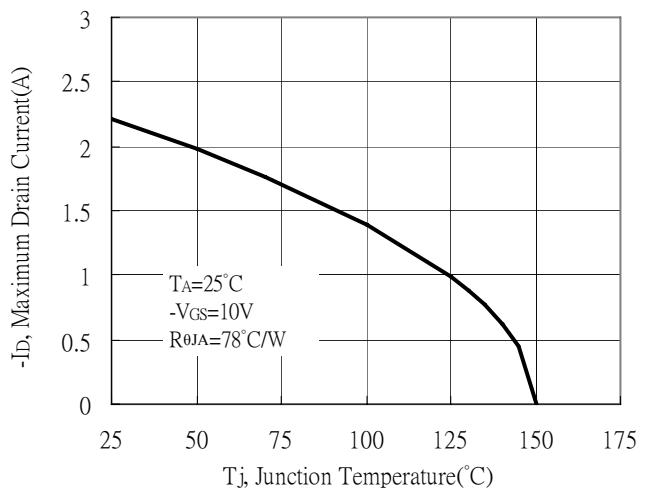
Gate Charge Characteristics



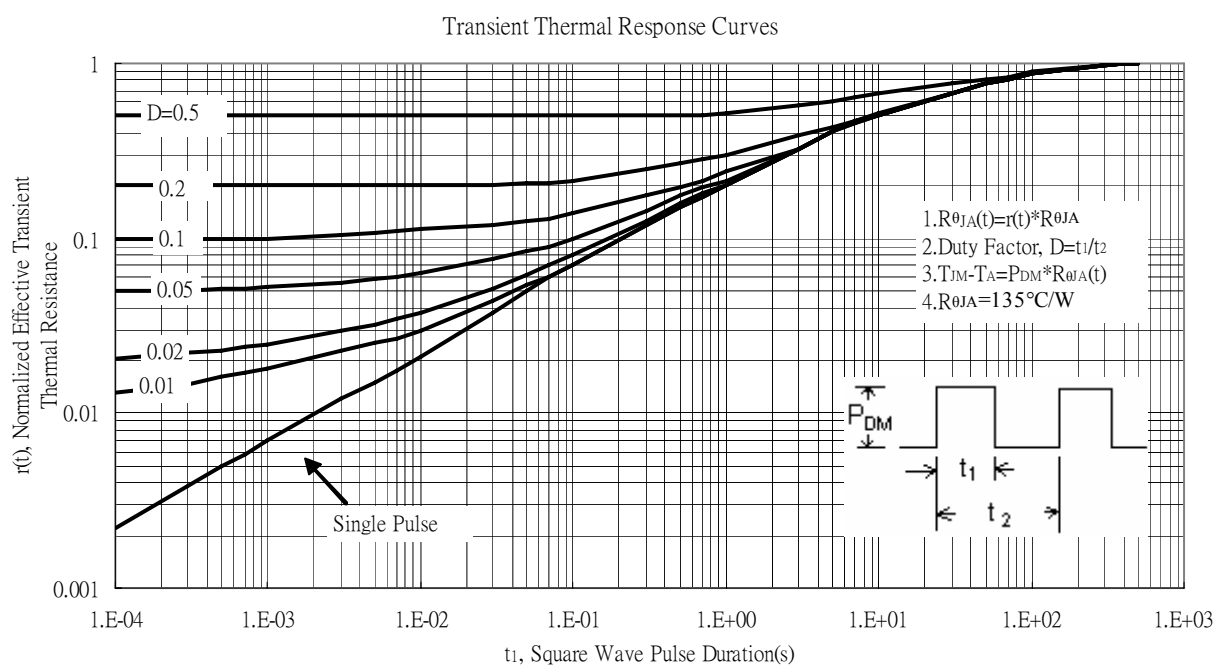
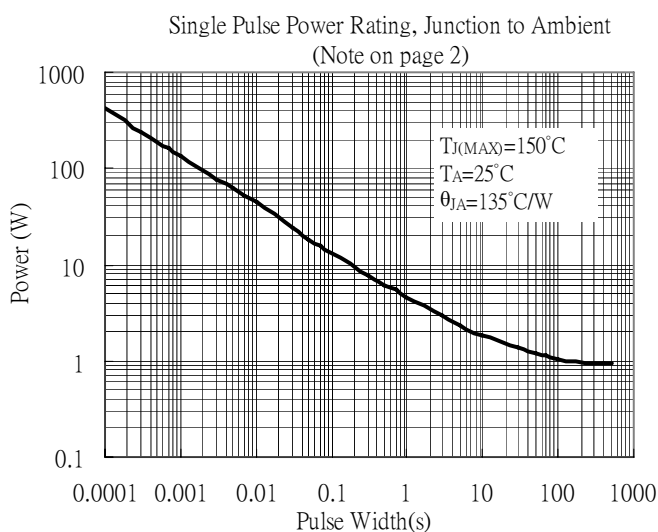
Maximum Safe Operating Area



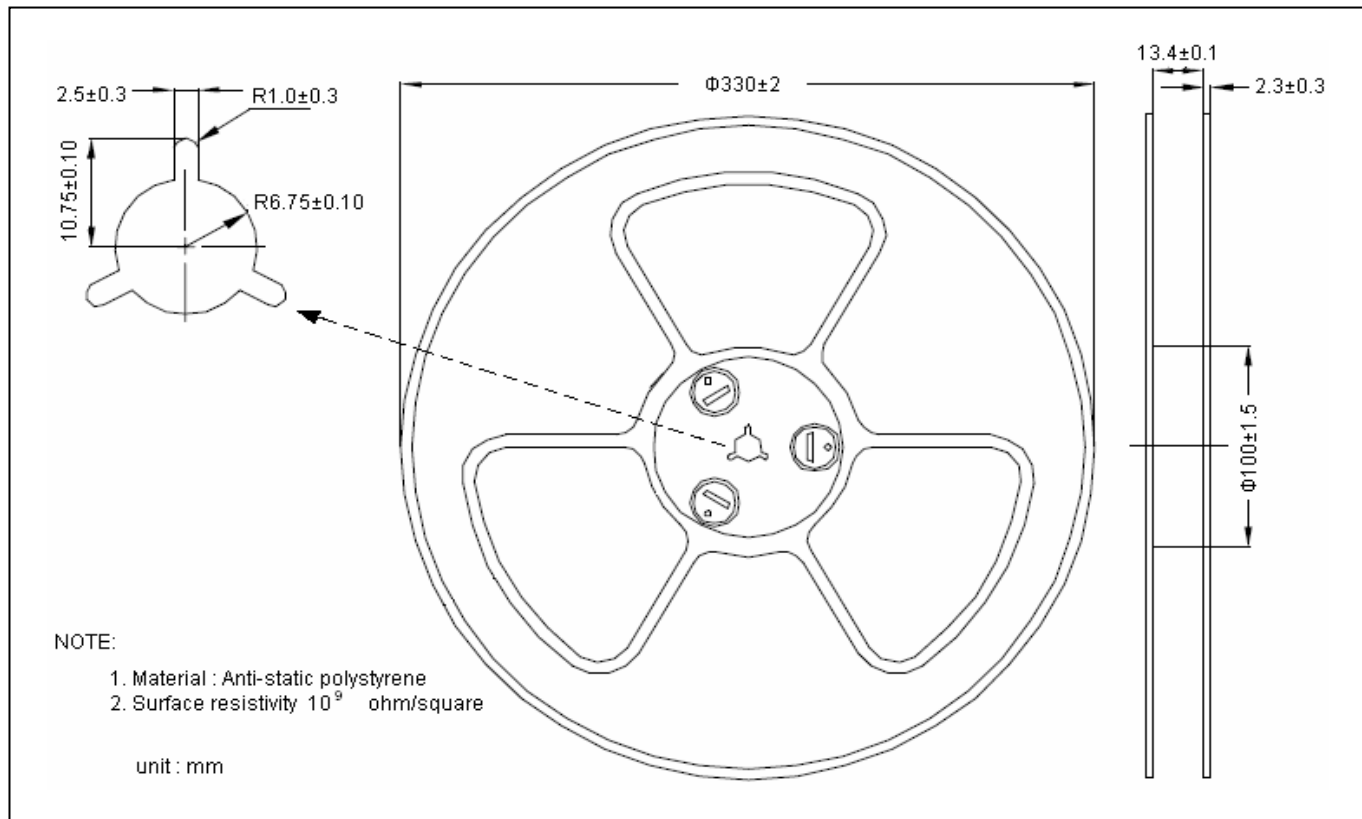
Maximum Drain Current vs Case Temperature



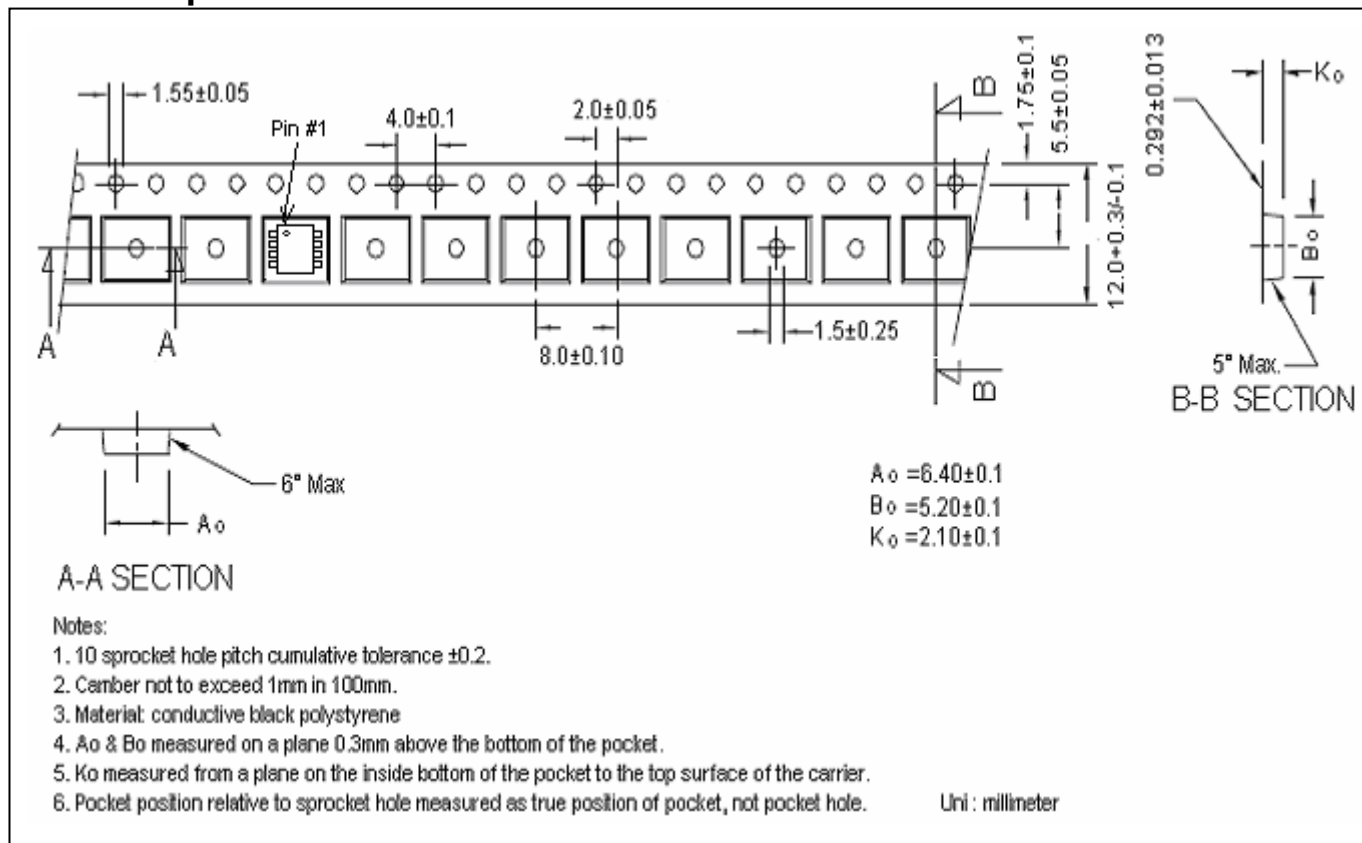
Typical Characteristics(Cont.) : Q2(P-channel)



Reel Dimension



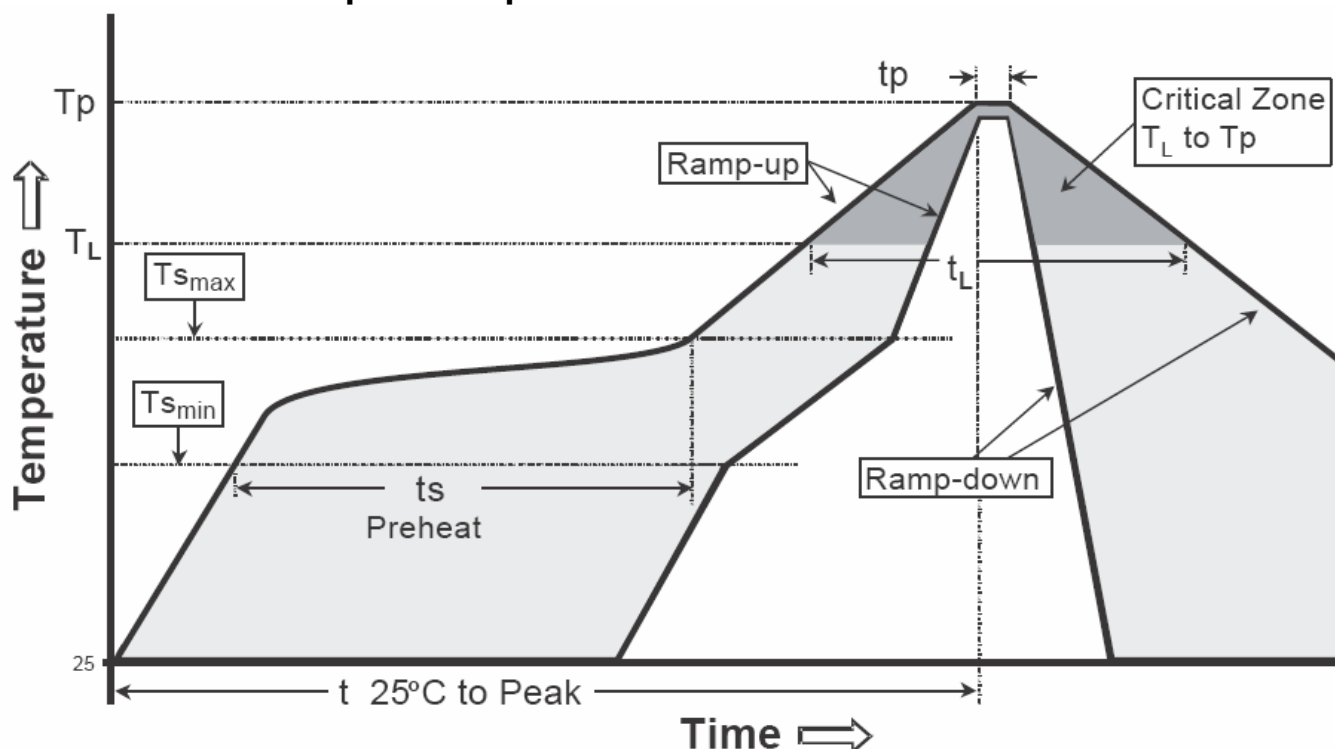
Carrier Tape Dimension



Recommended wave soldering condition

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

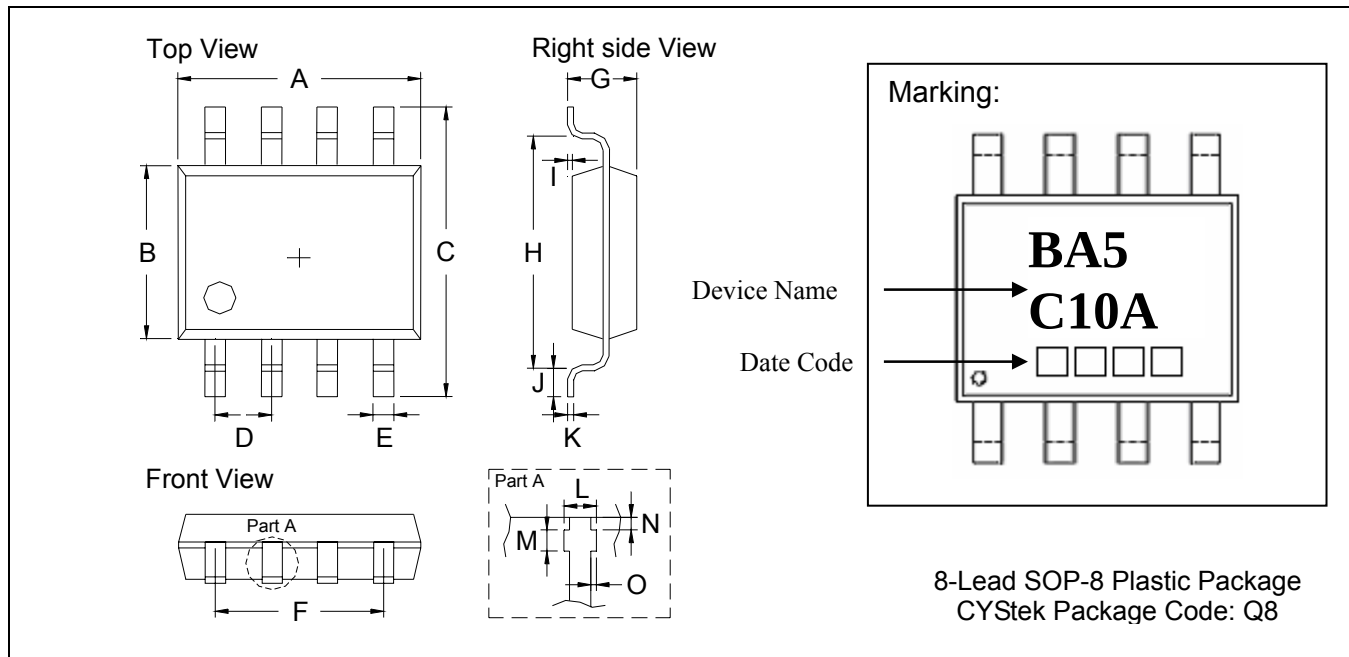
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	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	0.1909	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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