N- and P-Channel Enhancement Mode MOSFET

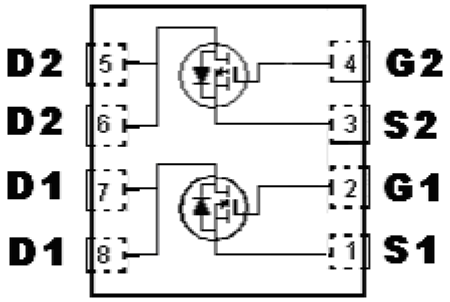
	N-CH	P-CH
BV_{DSS}	60V	-60V
I_D@V_{GS}=10V(-10V), T_A=25°C	5.1A	-4.1A
I_D@V_{GS}=10V(-10V), T_C=25°C	23A	-19A
$R_{DSON(typ)}$@V_{GS}=10V(-10V)	35.7mΩ	63.7mΩ
$R_{DSON(typ)}$@V_{GS}=4.5V(-4.5V)	40.0mΩ	85.6mΩ

Features

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

Equivalent Circuit

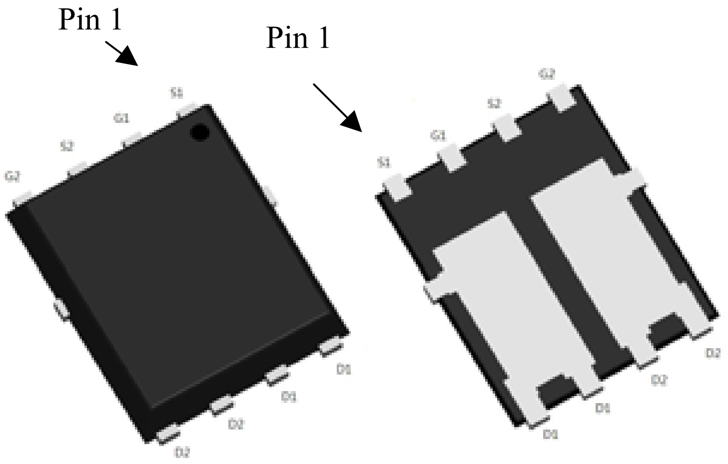
MTC5816H8



G：Gate S：Source D：Drain

Outline

DFN5×6



Ordering Information

Device	Package	Shipping
MTC5816H8-0-T6-G	DFN 5 ×6 (Pb-free lead plating & 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, T6 : 3000 pcs / tape & reel, 13" reel

Product rank, zero for no rank products

Product name

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

Parameter		Symbol	Limits		Unit
			N-channel	P-channel	
Drain-Source Breakdown Voltage		BV_{DSS}	60	-60	V
Gate-Source Voltage		V_{GS}	±20	±20	
Continuous Drain Current	T_A=25 °C, V_{GS}=10V (-10V)	I_{DSM}	5.1	-4.1	A
	T_A=70 °C, V_{GS}=10V (-10V)		3.2	-3.3	
	T_C=25 °C, V_{GS}=10V (-10V)	I_D	23	-19	
	T_C=100 °C, V_{GS}=10V (-10V)		14.6	-12	
Pulsed Drain Current (Note 1 & 2)		I_{DM}	46	-30	
Single Pulse Avalanche Current @ L=0.1mH		I_{AS}	20	-23	
Single Pulse Avalanche Energy (Note 4)		E_{AS}	32	32	mJ
Power Dissipation	T_A=25 °C	P_{DSM}	2.0 (Note 3)		W
	T_A=70 °C		1.3 (Note 3)		
	T_C=25 °C	P_D	41.7		
	T_C=100 °C		16.7		
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+150		°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	3	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	62 (Note 3)	

Note :
1. Pulse width limited by maximum junction temperature
2. Duty cycle≤1%
3. Surface mounted on 1 in² copper pad of FR-4 board; 125°C/W when mounted on minimum copper pad.
4. For N-channel, L=1mH, V_{DD}=25V, V_{GS}=10V, I_{AS}=8A; for P-channel, L=1mH, V_{DD}=-25V, V_{GS}=-10V, I_{AS}=-8A

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1.0	-	2.5		V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=48V, V_{GS}=0V
	-	-	25		V_{DS}=48V, V_{GS}=0, Tj=125°C
*$R_{DS(ON)}$	-	35.7	46	mΩ	I_D=8A, V_{GS}=10V
	-	40.0	54		I_D=4A, V_{GS}=4.5V
*G_{FS}	-	7.3	-	S	V_{DS}=10V, I_D=6A
Dynamic					
Ciss	-	935	1402	pF	V_{DS}=15V, V_{GS}=0V, f=1MHz
Coss	-	63	-		
Crss	-	46	-		

*$t_{d(ON)}$	-	8.8	-	ns	V_{DS}=30V, I_D=10A, V_{GS}=10V, R_G=3.3Ω
*t_r	-	16.2	-		
*$t_{d(OFF)}$	-	28.8	-		
*t_f	-	5.6	-		
*Q_g	-	18.1	27.2	nC	V_{DS}=48V, I_D=10A, V_{GS}=10V
*Q_{gs}	-	2.7	-		
*Q_{gd}	-	3.6	-		
Body Diode					
*I_S	-	-	23	A	
*I_{SM}	-	-	46		
*V_{SD}	-	0.73	1	V	V_{GS}=0V, I_S=1A
*t_{rr}	-	11	-	ns	I_F=11A, dI_F/dt=100A/μs
*Q_{rr}	-	7.7	-	nC	

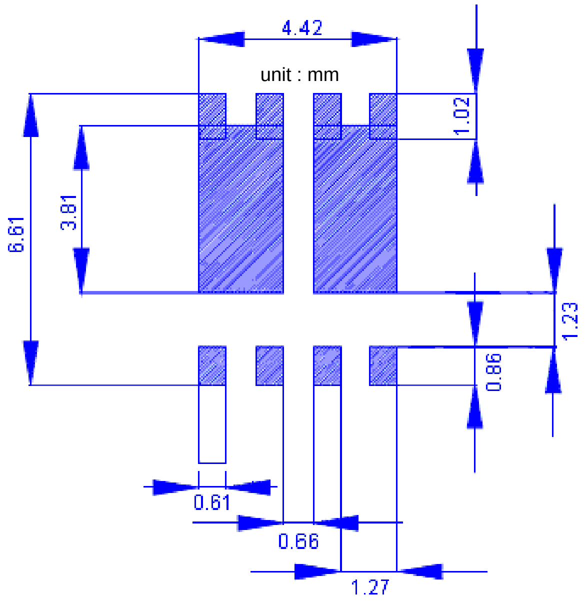
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

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

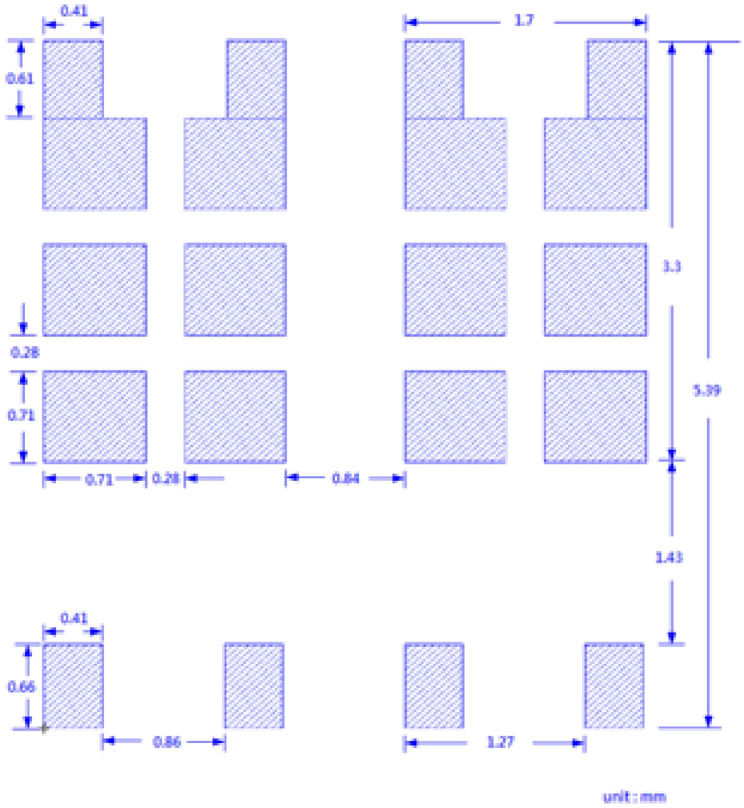
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-60	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-1.0	-	-2.5		V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-48V, V_{GS}=0V
	-	-	-25		V_{DS}=-48V, V_{GS}=0V, Tj=125°C
*$R_{DS(ON)}$	-	63.7	82	mΩ	I_D=-4A, V_{GS}=-10V
	-	85.6	102		I_D=-2A, V_{GS}=-4.5V
*G_{FS}	-	7.2	-	S	V_{DS}=-10V, I_D=-6A
Dynamic					
Ciss	-	875	1313	pF	V_{DS}=-15V, V_{GS}=0V, f=1MHz
Coss	-	69	-		
Crss	-	46	-		
*$t_{d(ON)}$	-	6.8	-	ns	V_{DS}=-15V, I_D=-1A, V_{GS}=-10V, R_G=3.3Ω
*t_r	-	18.4	-		
*$t_{d(OFF)}$	-	45.6	-		
*t_f	-	9.8	-		
*Q_g	-	16.2	24.3	nC	V_{DS}=-48V, I_D=-4A, V_{GS}=-10V
*Q_{gs}	-	2.9	-		
*Q_{gd}	-	3.2	-		
Body Diode					
*I_S	-	-	-19	A	
*I_{SM}	-	-	-30		
*V_{SD}	-	-0.76	-1	V	V_{GS}=0V, I_S=-1A
*t_{rr}	-	9.4	-	ns	I_F=-1A, dI_F/dt=100A/μs
*Q_{rr}	-	4.5	-	nC	

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

Recommended Soldering Footprint



Recommended Stencil Design

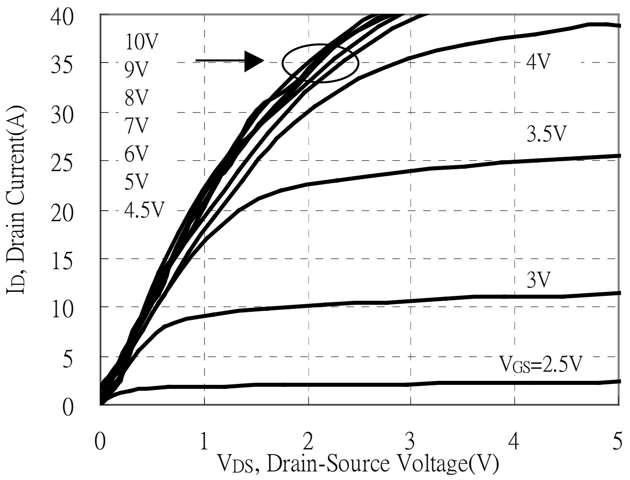


Note : 1. Stencil thickness 5 mil (0.127mm)

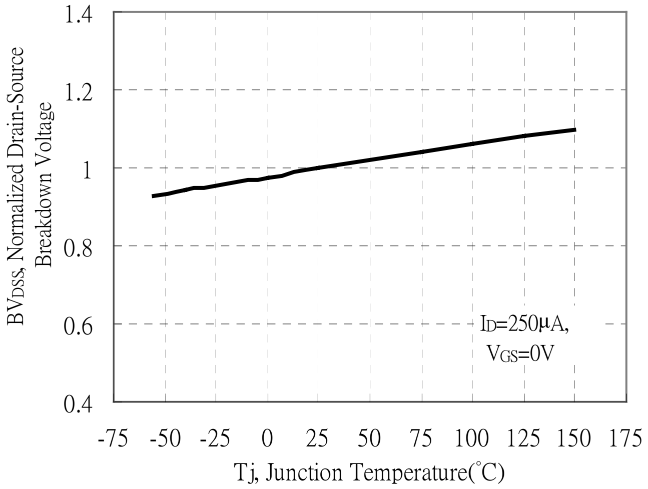
2. May need to be adjusted to specific requirements.

Typical Characteristics : Q1(N-channel)

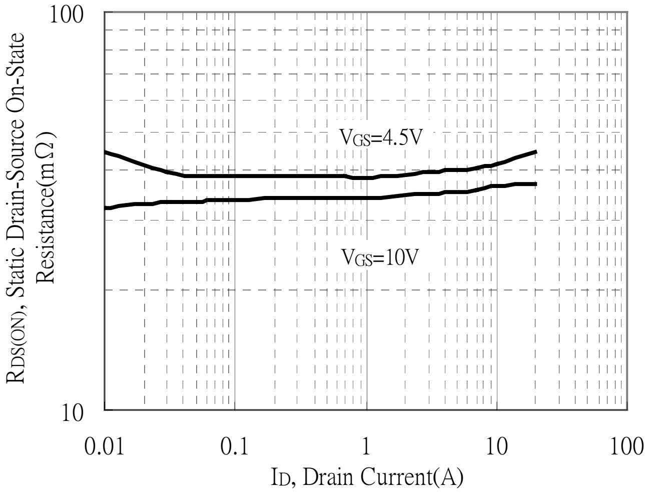
Typical Output Characteristics



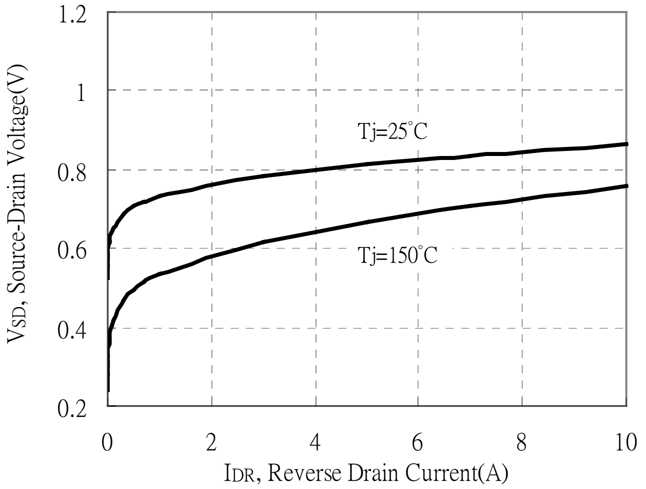
Brekdown Voltage vs Ambient Temperature



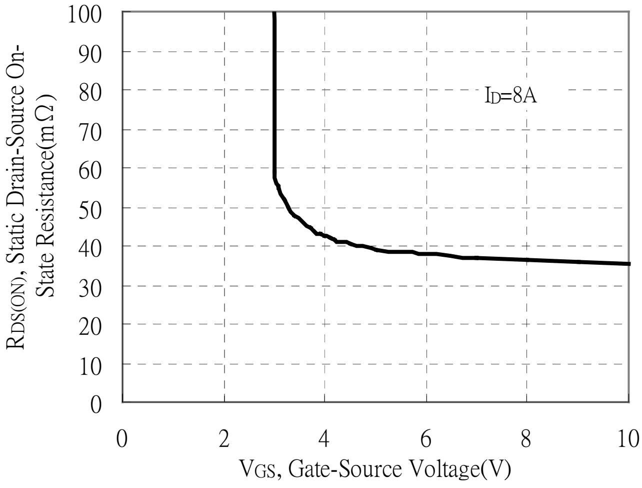
Static Drain-Source On-State resistance vs Drain Current



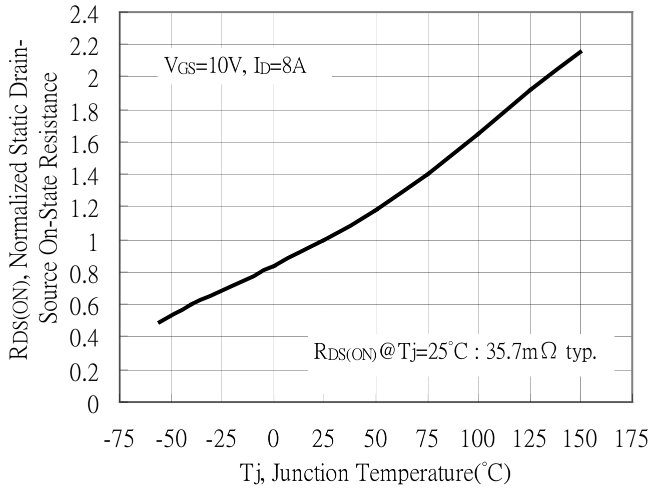
Reverse Drain Current vs Source-Drain Voltage



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

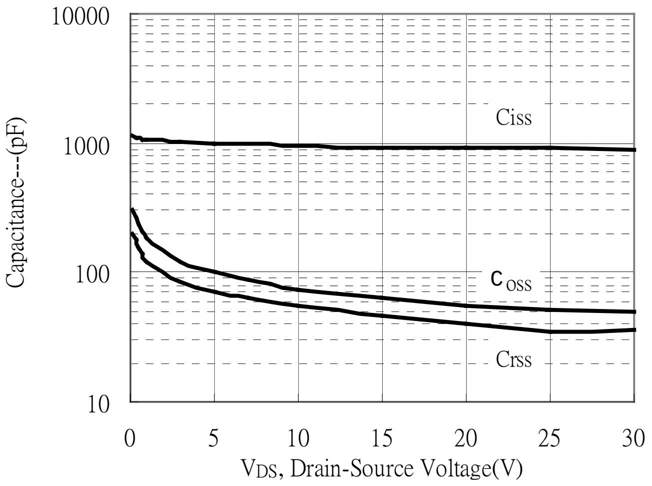


Drain-Source On-State Resistance vs Junction Tempeartue

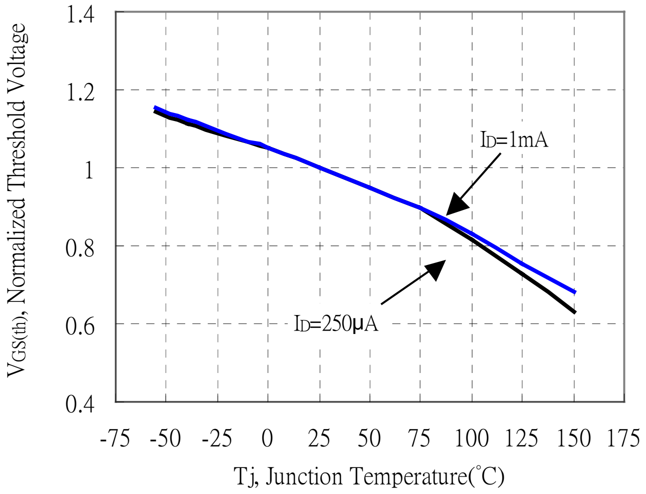


Typical Characteristics(Cont.) : Q1(N-channel)

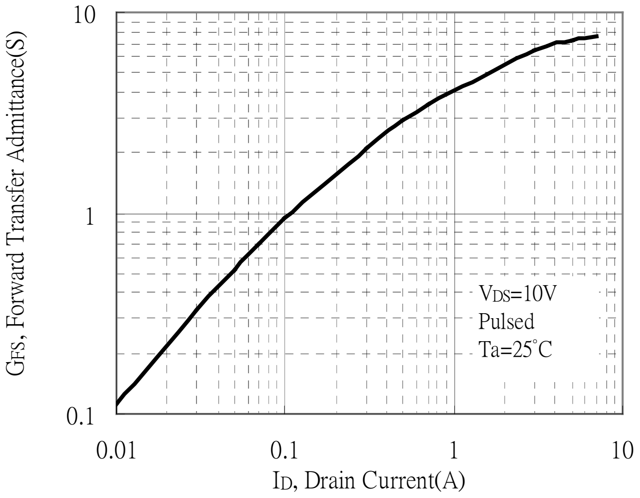
Capacitance vs Drain-to-Source Voltage



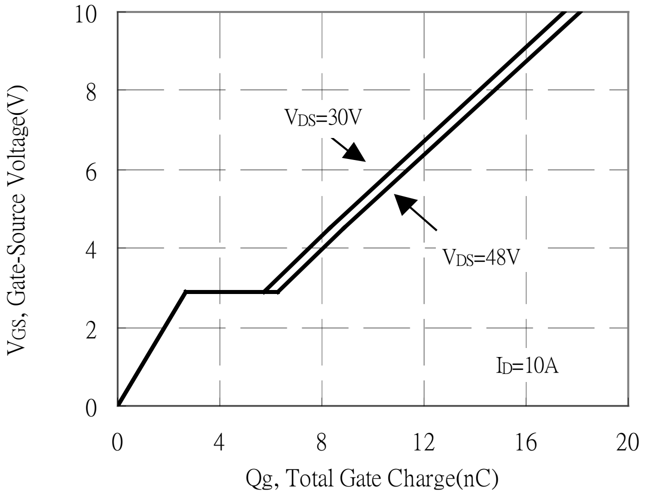
Threshold Voltage vs Junction Tempearture



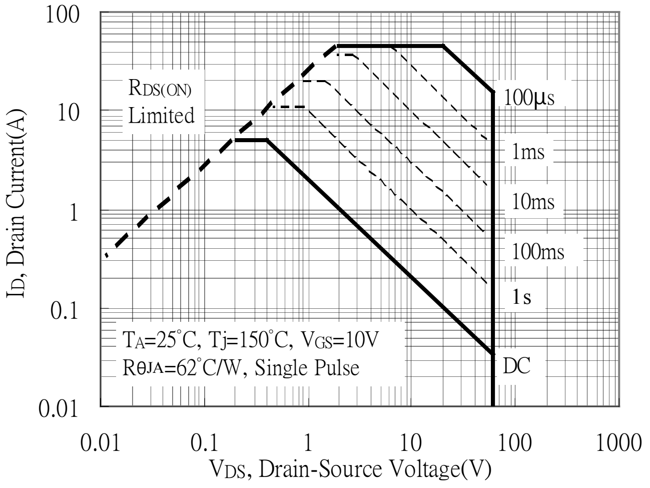
Forward Transfer Admittance vs Drain Current



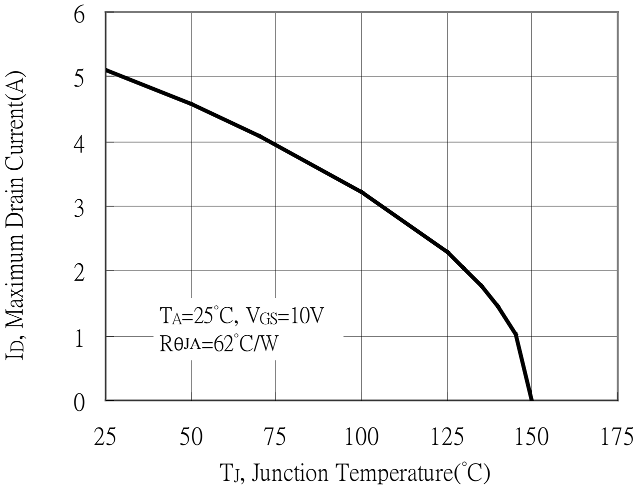
Gate Charge Characteristics



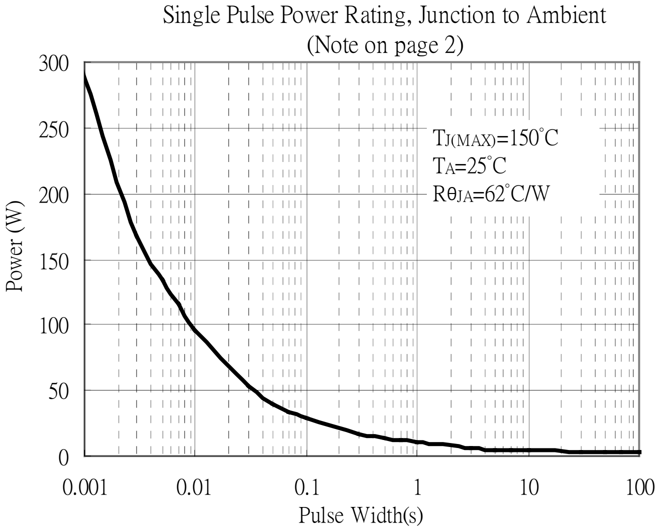
Maximum Safe Operating Area

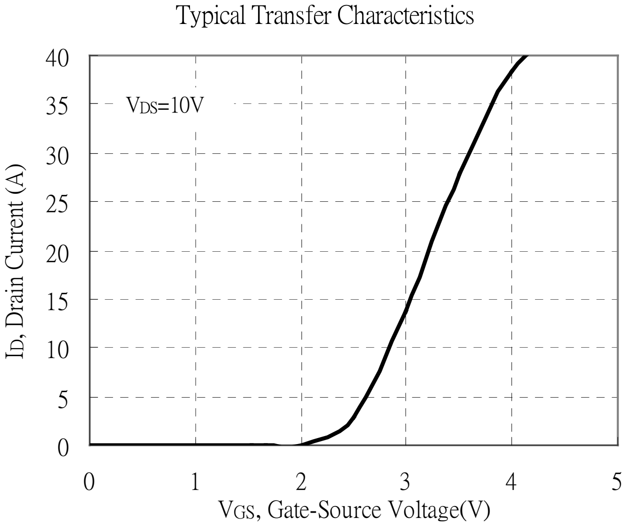


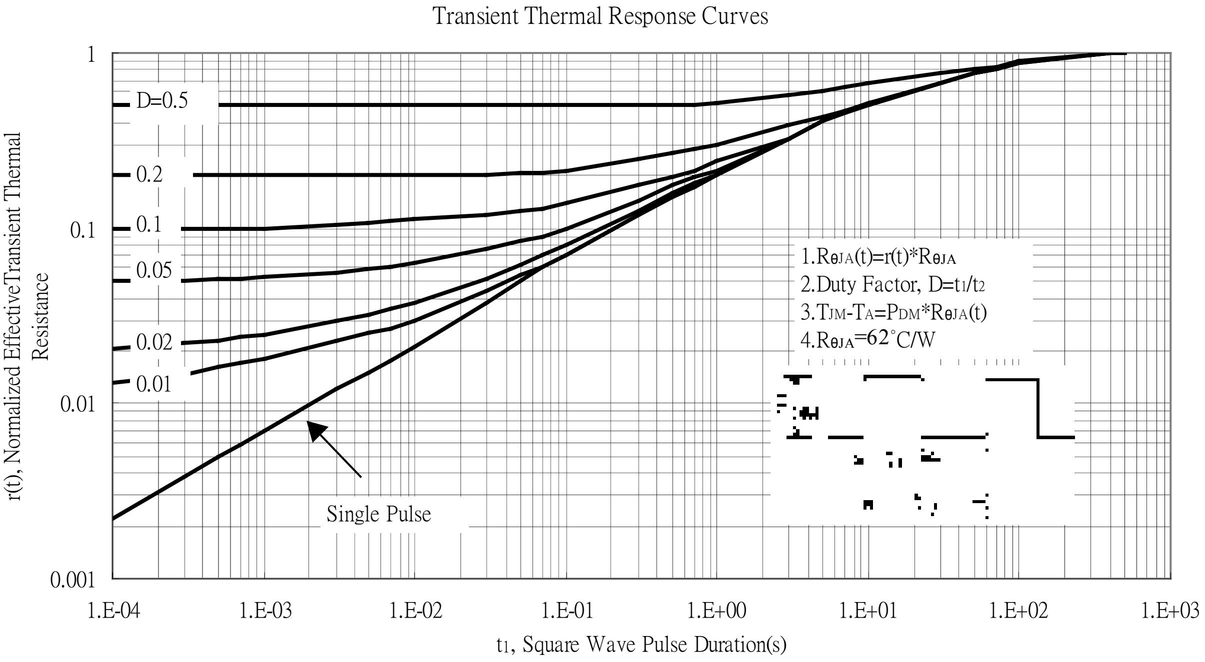
Maximum Drain Current vs JunctionTemperature



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

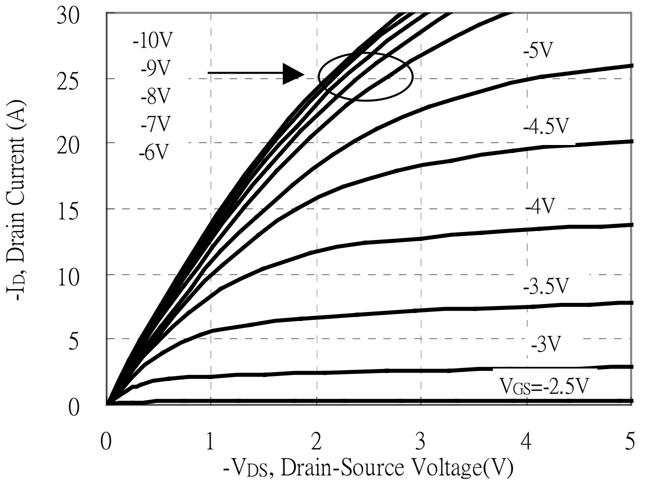




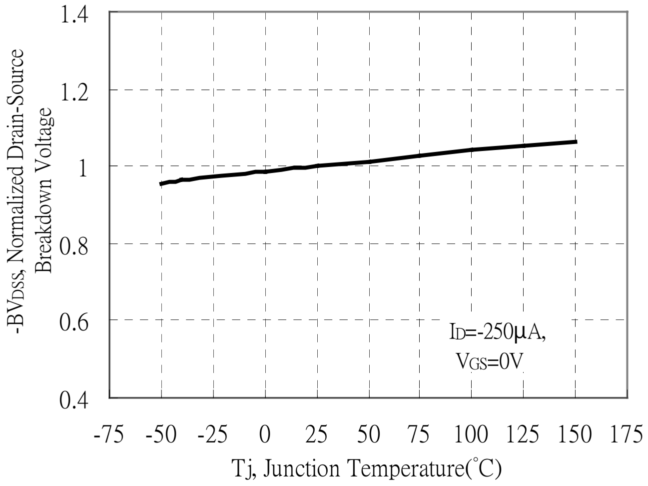


Typical Characteristics : Q2(P-channel)

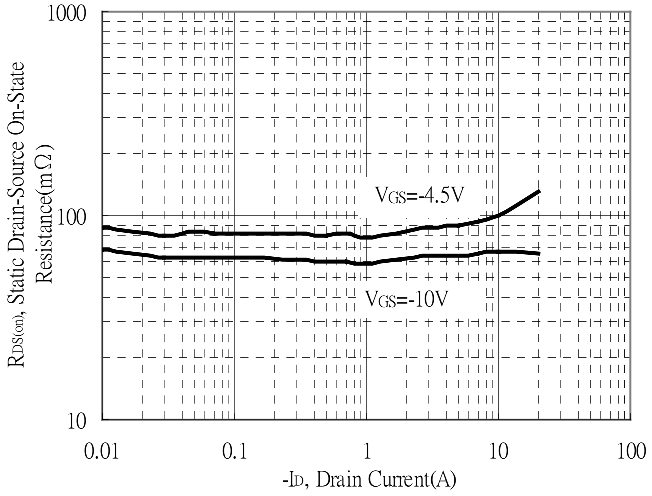
Typical Output Characteristics



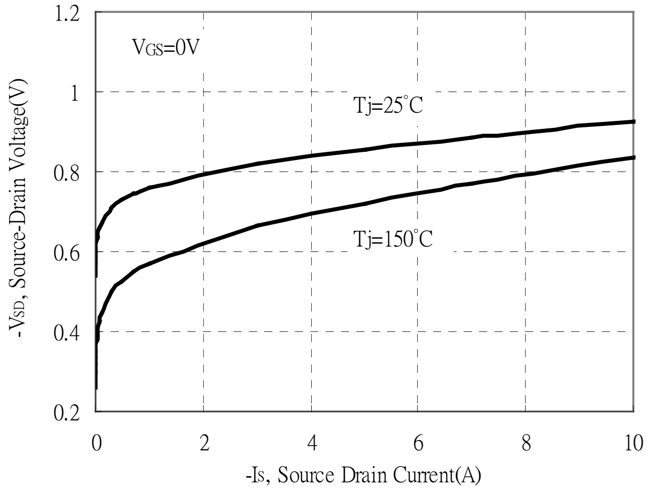
Brekdown Voltage vs Ambient Temperature



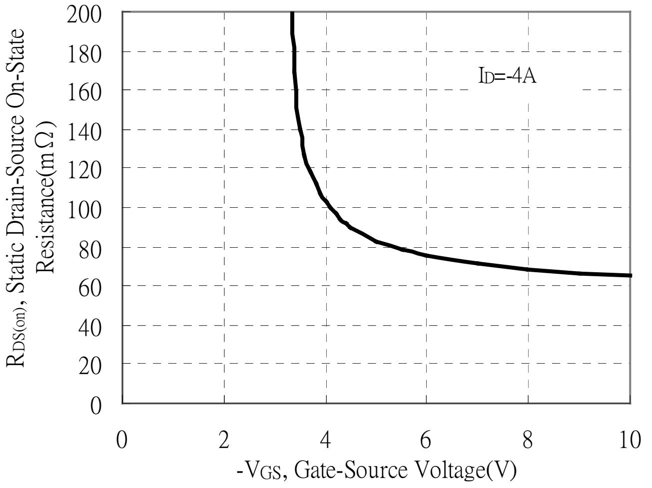
Static Drain-Source On-State resistance vs Drain Current



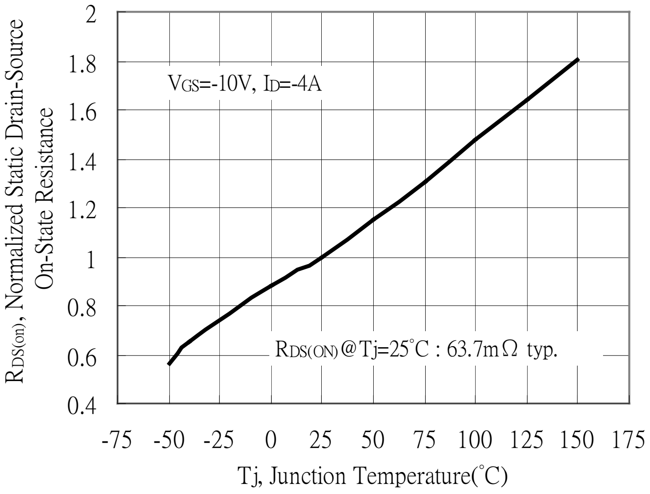
Source Drain Current vs Source-Drain Voltage



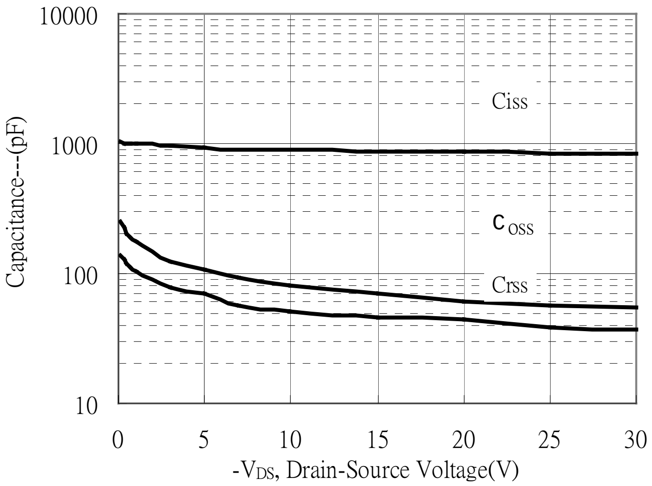
Static Drain-Source On-State Resistance vs Gate-Source Voltage

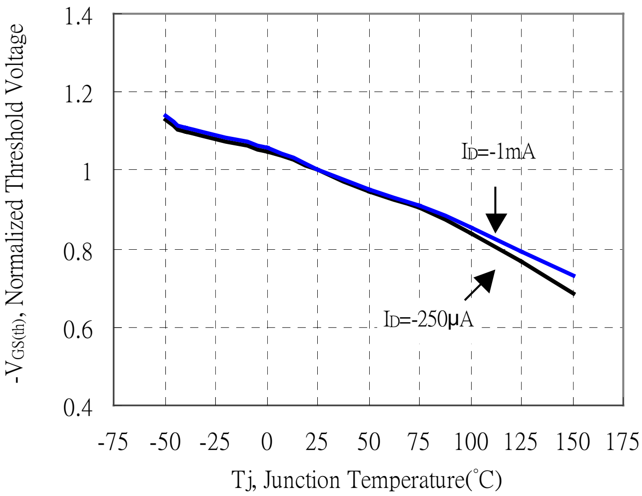


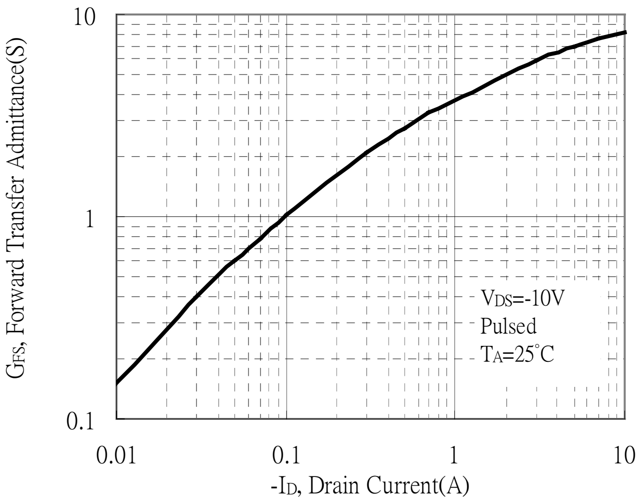
Drain-Source On-State Resistance vs Junction Tempearture

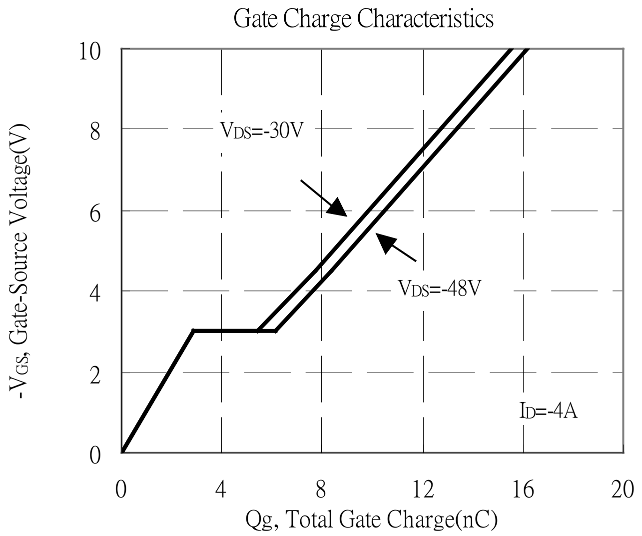


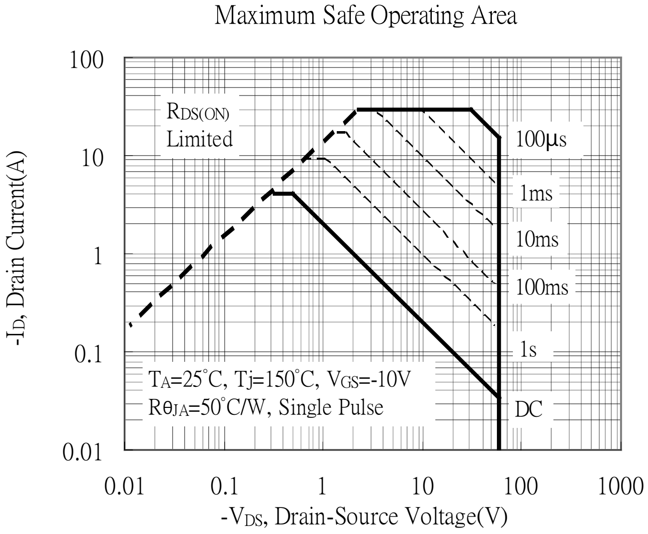
Typical Characteristics(Cont.) : Q2(P-channel)

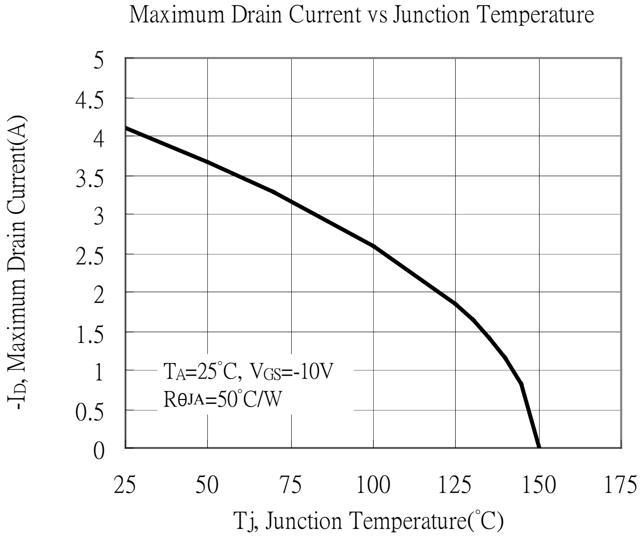

Capacitance vs Drain-to-Source Voltage


Threshold Voltage vs Junction Tempearture

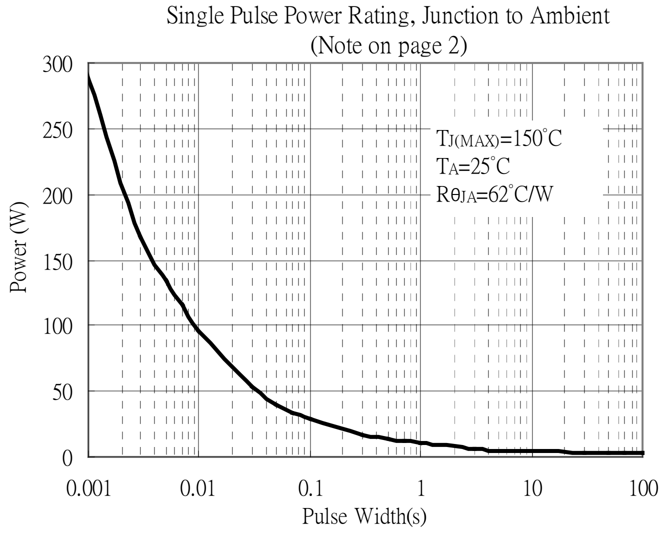

Forward Transfer Admittance vs Drain Current


Gate Charge Characteristics

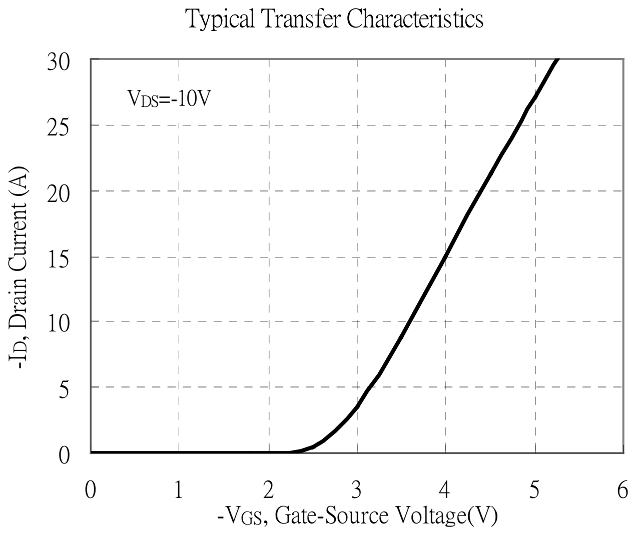

Maximum Safe Operating Area


Maximum Drain Current vs Junction Temperature

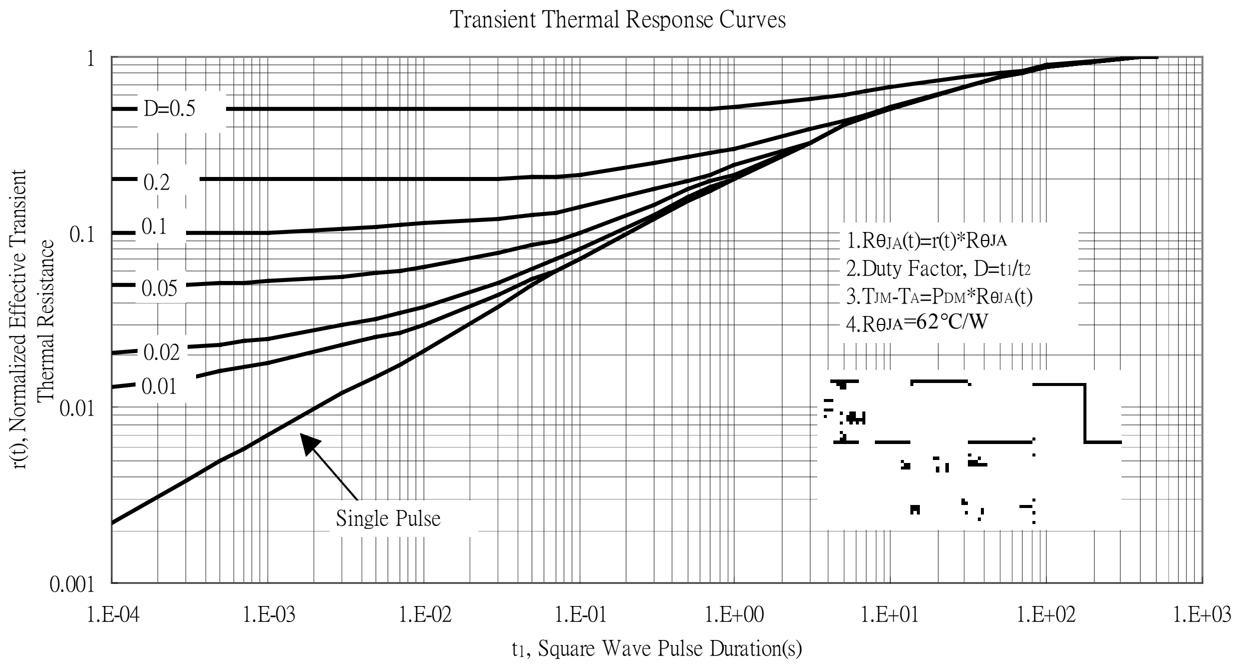
Typical Characteristics(Cont.) : Q2(P-channel)


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

$T_{J(MAX)}$=150˚C
T_A=25˚C
$R_{\theta JA}$=62˚C/W

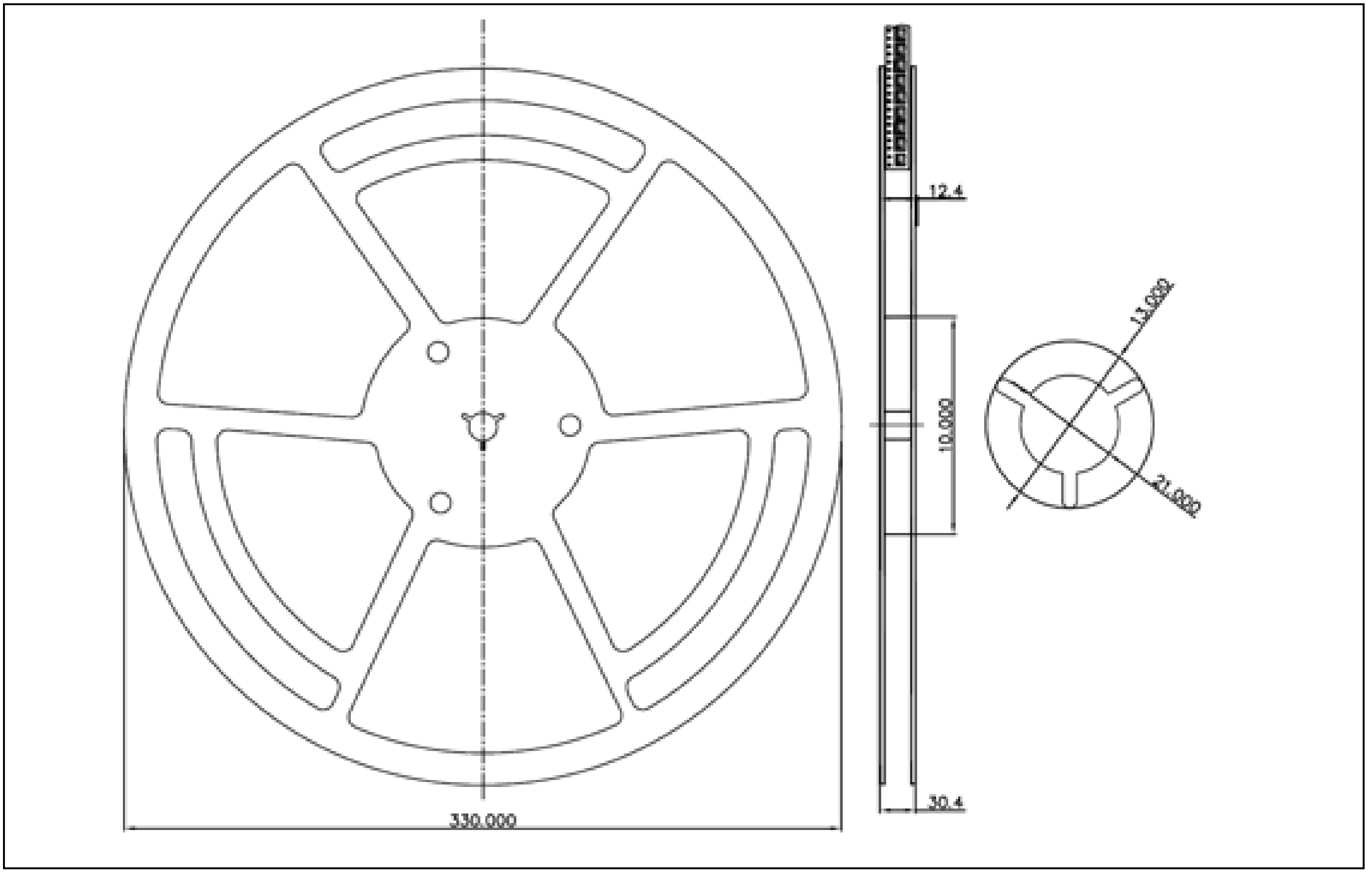

Typical Transfer Characteristics

V_{DS}=-10V

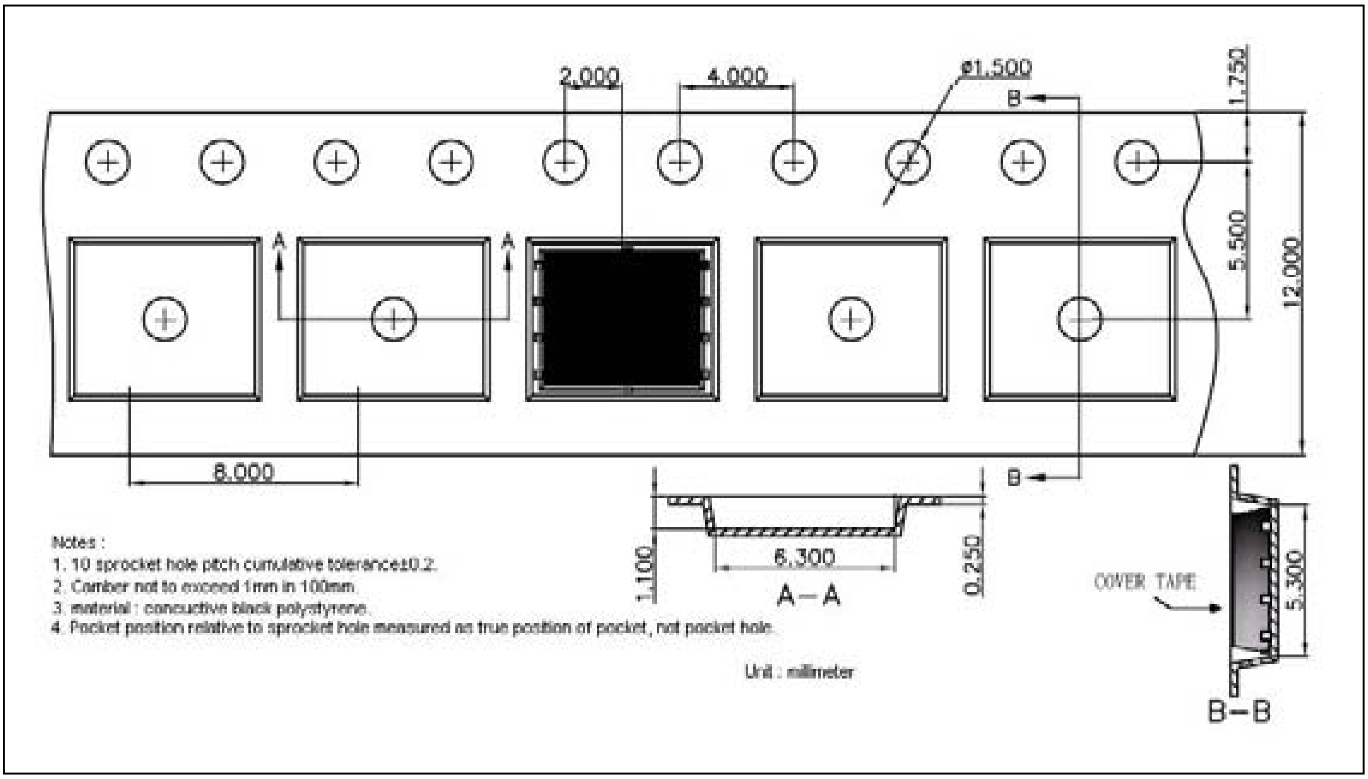

Transient Thermal Response Curves

1.$R_{\theta JA}(t)=r(t)*R_{\theta JA}$
2.Duty Factor, $D=t_1/t_2$
3.$T_{JM}-T_A=P_{DM}*R_{\theta JA}(t)$
4.$R_{\theta JA}$=62°C/W

Reel Dimension



Carrier Tape Dimension



Notes :

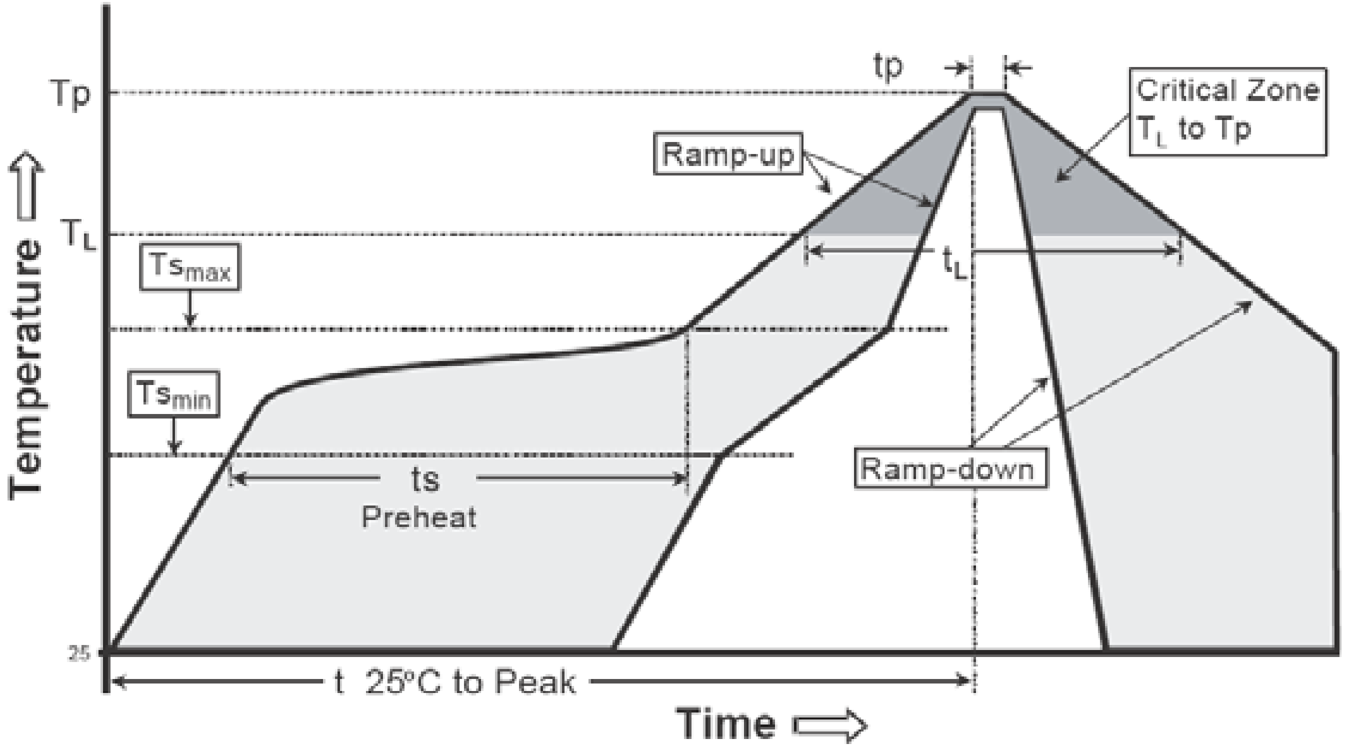
1. 10 sprocket hole pitch cumulative tolerance±0.2.
2. Camber not to exceed 1mm in 100mm.
3. material : concuctive black polystyrene.
4. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : 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

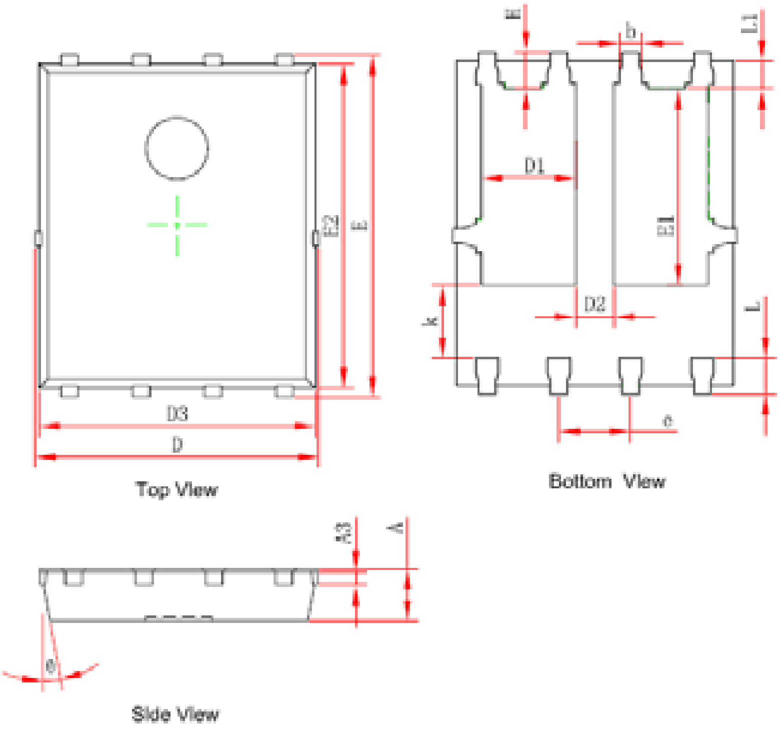


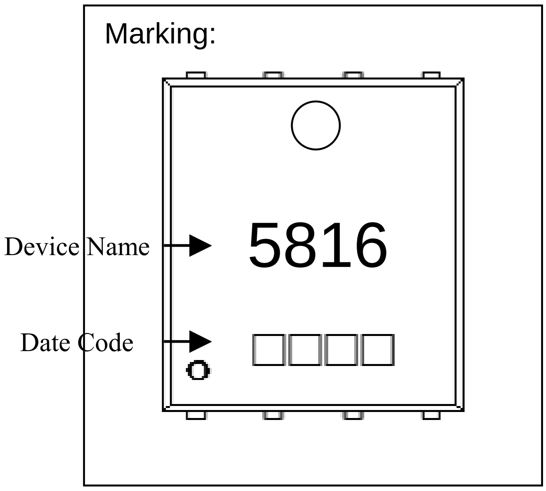
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts_{min} to ts_{max})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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 :1. All temperatures refer to topside of the package, measured on the package body surface.

2.For devices mounted on FR-4 PCB of 1.6mm or equivalent grade PCB. If other grade PCB is used, care should be taken to match the coefficients of thermal expansion between components and PCB. If they are not matched well, the solder joints may crack or the bodies of the parts may crack or shatter as the assembly cools.

DFN5x6 Dimension





8-Lead DFN5x6 Plastic Package
Package Code : H8

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039	E2	5.674	5.826	0.223	0.229
A3	0.254 REF		0.010 REF		k	1.190	1.390	0.047	0.055
D	4.944	5.096	0.195	0.201	b	0.350	0.450	0.014	0.018
E	5.974	6.126	0.235	0.241	e	1.270 TYP		0.050 TYP	
D1	1.470	1.870	0.058	0.074	L	0.559	0.711	0.022	0.028
D2	0.470	0.870	0.019	0.034	L1	0.424	0.576	0.017	0.023
E1	3.375	3.575	0.133	0.141	H	0.574	0.726	0.023	0.029
D3	4.824	4.976	0.190	0.196	θ	10°	12°	10°	12°

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.