N- AND P-Channel Logic Level Enhancement Mode MOSFET

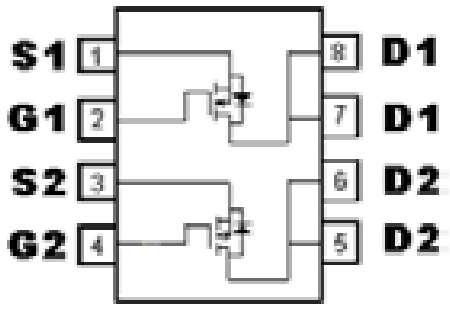
Features

- 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	4.3A	-3.3A
I_D@V_{GS}=10V(-10V), T_C=25°C	6.4A	-4.6A
R_{DSON}@V_{GS}=10V(-10V) typ.	37mΩ	70mΩ
R_{DSON}@V_{GS}=4.5V(-4.5V) typ.	42mΩ	93mΩ

Equivalent Circuit

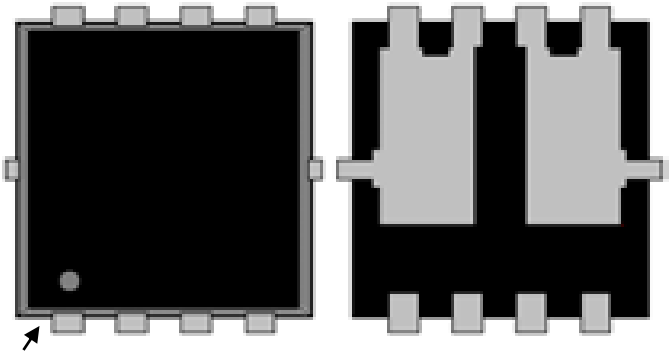
MTC5816V8



G：Gate S：Source D：Drain

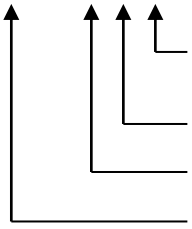
Outline

DFN3×3



Ordering Information

Device	Package	Shipping
MTC5816V8-0-T6-G	DFN3×3 (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, 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 *2	T_A=25 °C, V_{GS}=10V (-10V)	I_{DSM}	4.3	-3.3	A
	T_A=70 °C, V_{GS}=10V (-10V)		3.4	-2.6	
Continuous Drain Current	T_C=25 °C, V_{GS}=10V (-10V)	I_D	6.4	-4.6	
	T_C=100 °C, V_{GS}=10V (-10V)		4.5	-3.3	
Pulsed Drain Current * 3		I_{DM}	20	-20	
Total Power Dissipation	T_A=25°C, Single device operation	P_{DSM}	1.5 *2		W
	T_A=70°C, Single device operation		0.96 *2		
	T_A=25°C, Single device value at dual operation		1.24 *2		
	T_A=70°C, Single device value at dual operation		0.79 *2		
	T_C=25°C	P_D * 1	3.75		
	T_C=100°C		1.88		
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+175		°C

Thermal Data

Parameter	Symbol	Value	Unit
Max. Thermal Resistance, Junction-to-ambient, single device operation	$R_{th,j-a}$	84 *2	°C/W
Max. Thermal Resistance, Junction-to-ambient, single device value at dual operation		101 *2	
Max. Thermal Resistance, Junction-to-case	$R_{th,j-c}$	40	

Note : 1.The power dissipation P_D is based on $T_{J(MAX)}$=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in²FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C, t≤5s. 216°C/W when mounted on a minimum pad of 2 oz. copper. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

3. Pulse width limited by junction temperature $T_{J(MAX)}$=175°C. Ratings are based on low duty cycles to keep initial T_J=25°C.

N-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	-	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
	-	-	10		V_{DS}=48V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	37	58	mΩ	V_{GS}=10V, I_D=4.3A
	-	42	60		V_{GS}=4.5V, I_D=4A
*G_{FS}	-	9.5	-	S	V_{DS}=5V, I_D=4.3A

Dynamic					
Ciss	-	1173	-	pF	V_{DS}=25V, V_{GS}=0V, f=1MHz
Coss	-	45	-		
Crss	-	35	-		
*$t_{d(ON)}$	-	9.2	-	ns	V_{DS}=30V, I_D=1A, V_{GS}=10V, R_G=6Ω
*t_r	-	16.6	-		
*$t_{d(OFF)}$	-	37.2	-		
*t_f	-	15.6	-		
*Qg	-	18	-	nC	V_{DS}=30V, I_D=4.3A, V_{GS}=10V
*Qgs	-	3.0	-		
*Qgd	-	2.6	-		
Body Diode					
*V_{SD}	-	0.74	1.2	V	V_{GS}=0V, I_S=1.3A
*trr	-	12	-	ns	I_S=1.3A, V_{GS}=0V, dI/dt=100A/μs
*Qrr	-	6	-	nC	

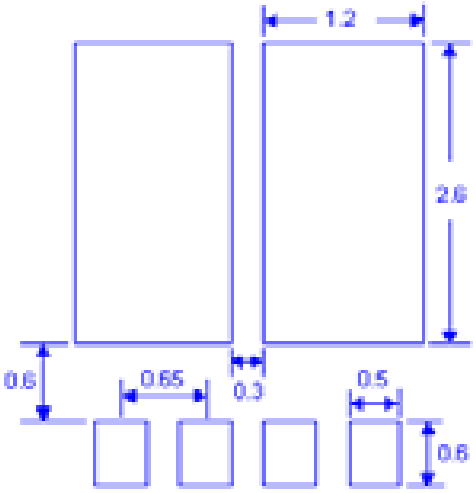
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-60	-	-	V	V_{GS}=0, 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
	-	-	-10		V_{DS}=-48V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	70	90	mΩ	V_{GS}=-10V, I_D=-3.3A
	-	93	125		V_{GS}=-4.5V, I_D=-3A
*G_{FS}	-	8.5	-	S	V_{DS}=-5V, I_D=-3.3A
Dynamic					
Ciss	-	940	-	pF	V_{DS}=-25V, V_{GS}=0V, f=1MHz
Coss	-	49	-		
Crss	-	35	-		
*$t_{d(ON)}$	-	7.4	-	ns	V_{DS}=-50V, I_D=-1A, V_{GS}=-10V, R_G=6Ω
*tr	-	18.8	-		
*$t_{d(OFF)}$	-	64.6	-		
*tf	-	28.2	-		
*Qg	-	19.3	-	nC	V_{DS}=-30V, I_D=-3.3A, V_{GS}=-10V
*Qgs	-	2.7	-		
*Qgd	-	3.0	-		
Body Diode					
*V_{SD}	-	-0.76	-1.2	V	V_{GS}=0V, I_S=-1.3A
*trr	-	10	-	ns	I_S=-1.3A, V_{GS}=0V, dI/dt=100A/μs
*Qrr	-	5	-	nC	

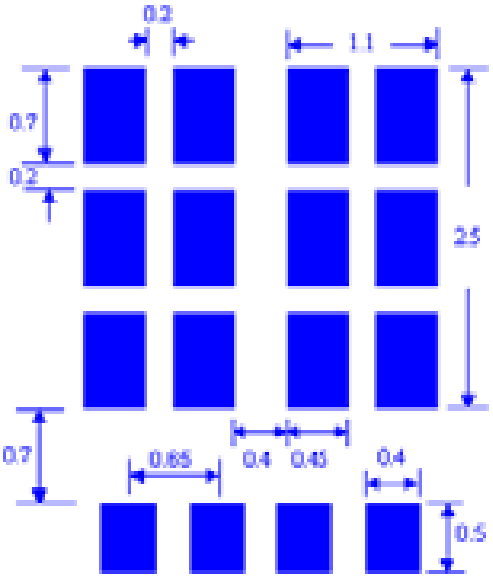
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Recommended Soldering Footprint



unit : mm

Recommended Stencil Design



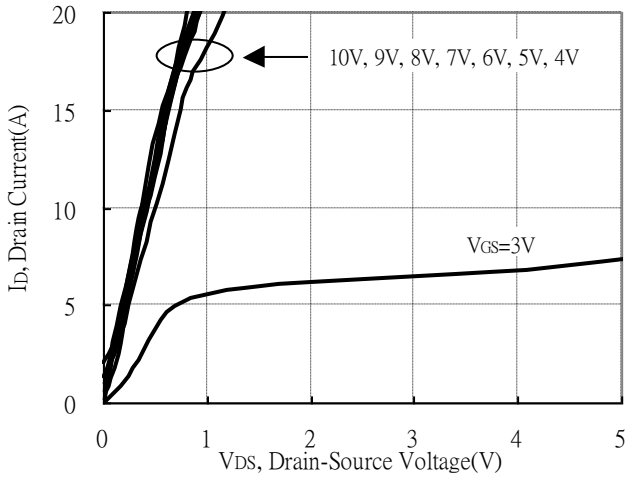
Note : 1. Stencil thickness 5 mil (0.127mm)

2. May need to be adjusted to specific requirements.

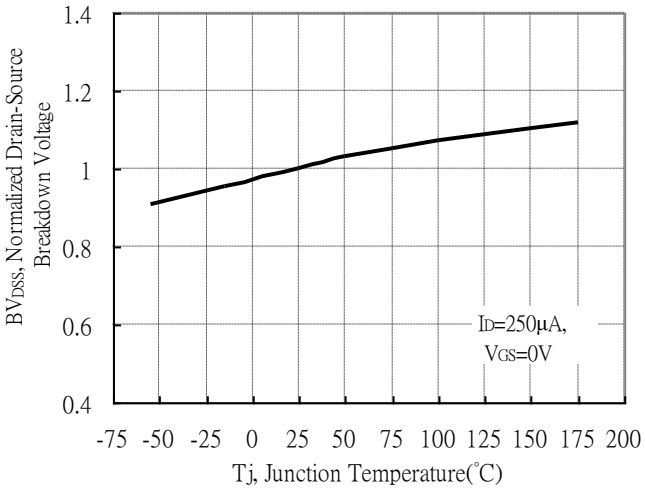
3. Unit : mm

Typical Characteristics : Q1(N-channel)

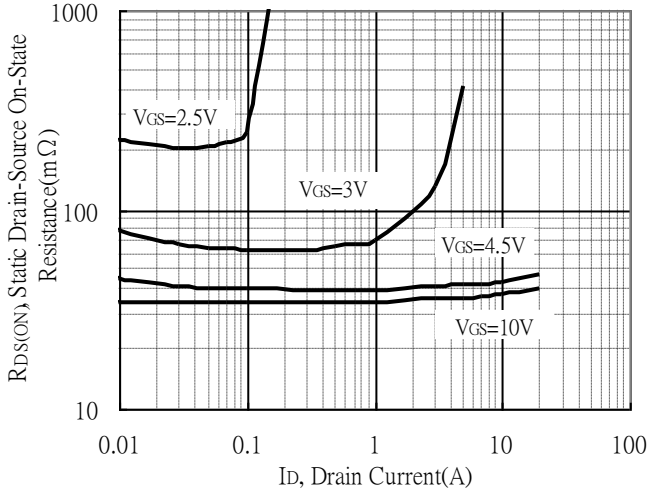
Typical Output Characteristics



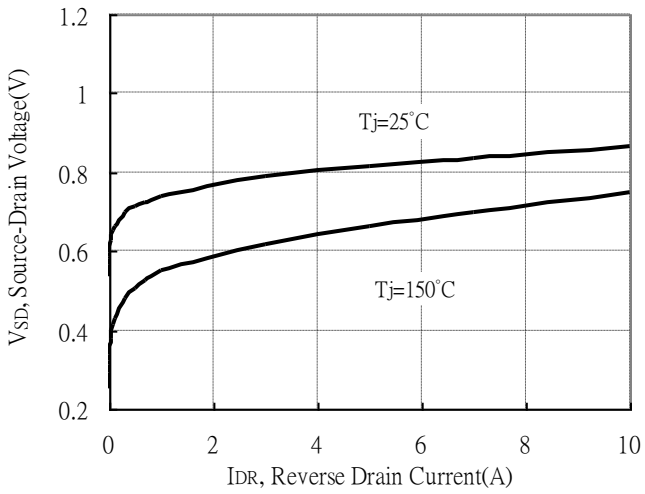
Brekdown Voltage vs Ambient Temperature



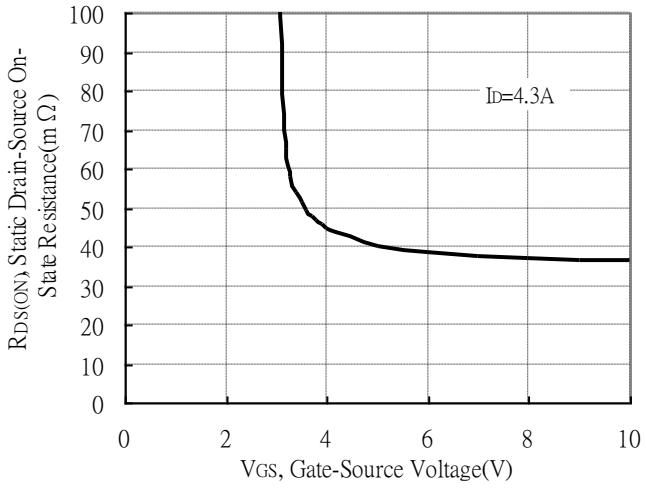
Static Drain-Source On-State resistance vs Drain Current



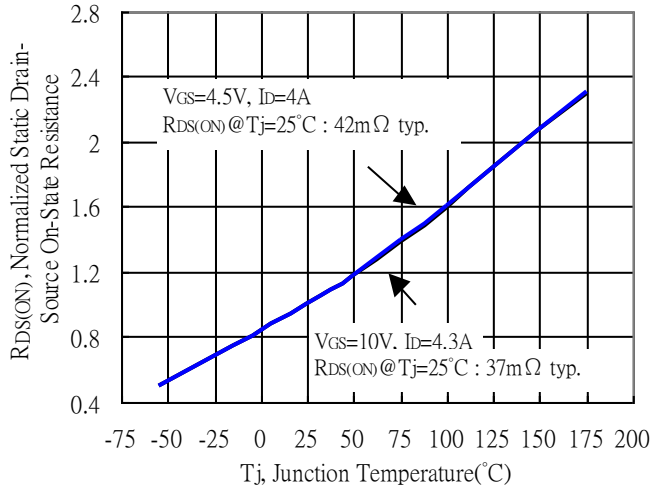
Reverse Drain Current vs Source-Drain Voltage



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

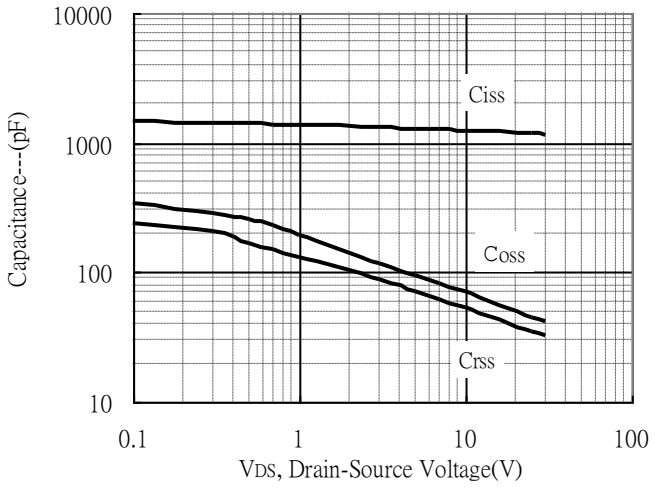


Drain-Source On-State Resistance vs Junction Tempearture

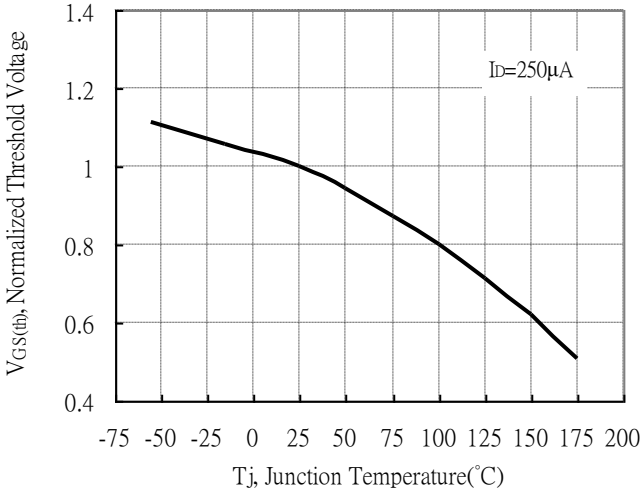


Typical Characteristics(Cont.) : Q1(N-channel)

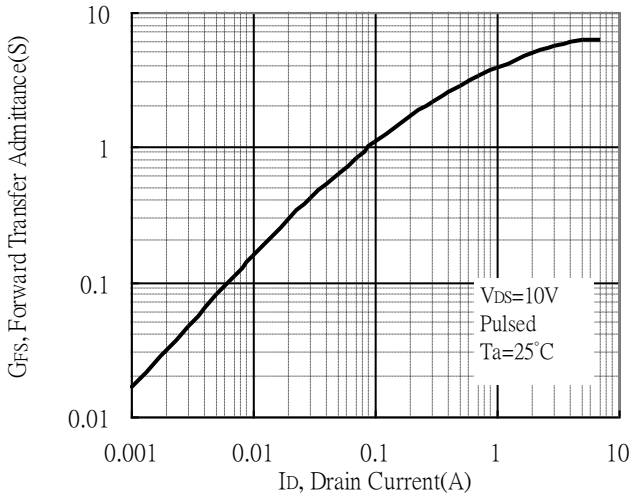
Capacitance vs Drain-to-Source Voltage



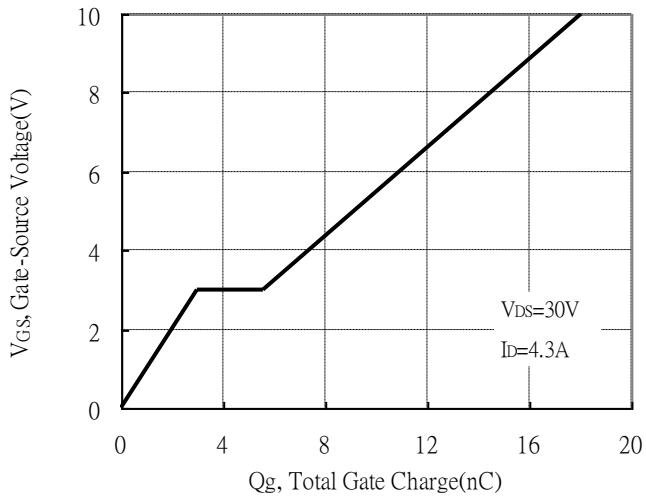
Threshold Voltage vs Junction Tempearture



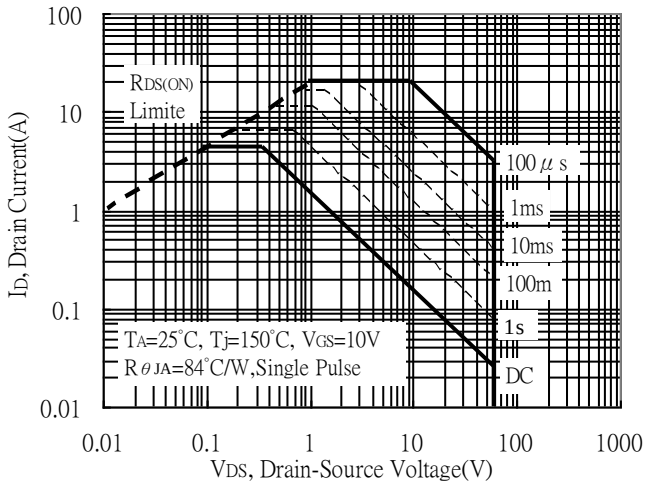
Forward Transfer Admittance vs Drain Current



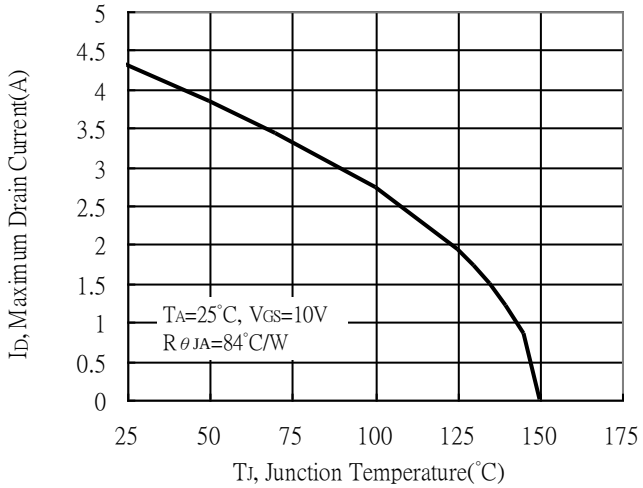
Gate Charge Characteristics



Maximum Safe Operating Area

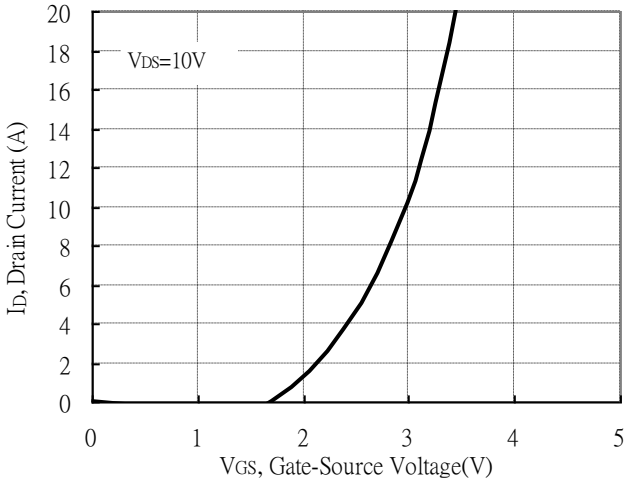


Maximum Drain Current vs Junction Temperature

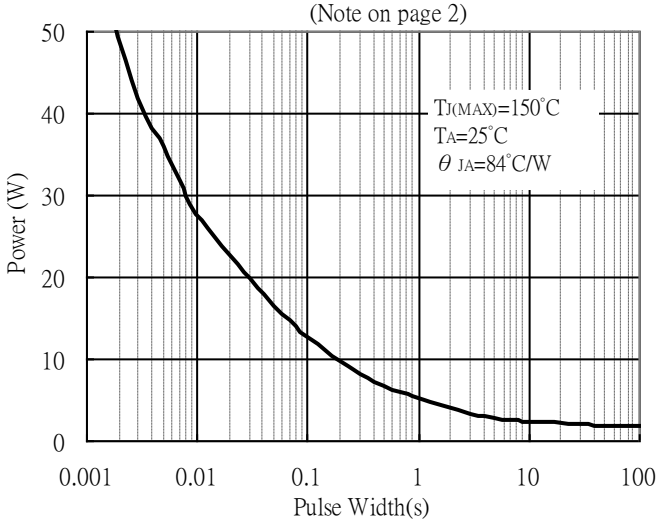


Typical Characteristics(Cont.) : Q1(N-channel)

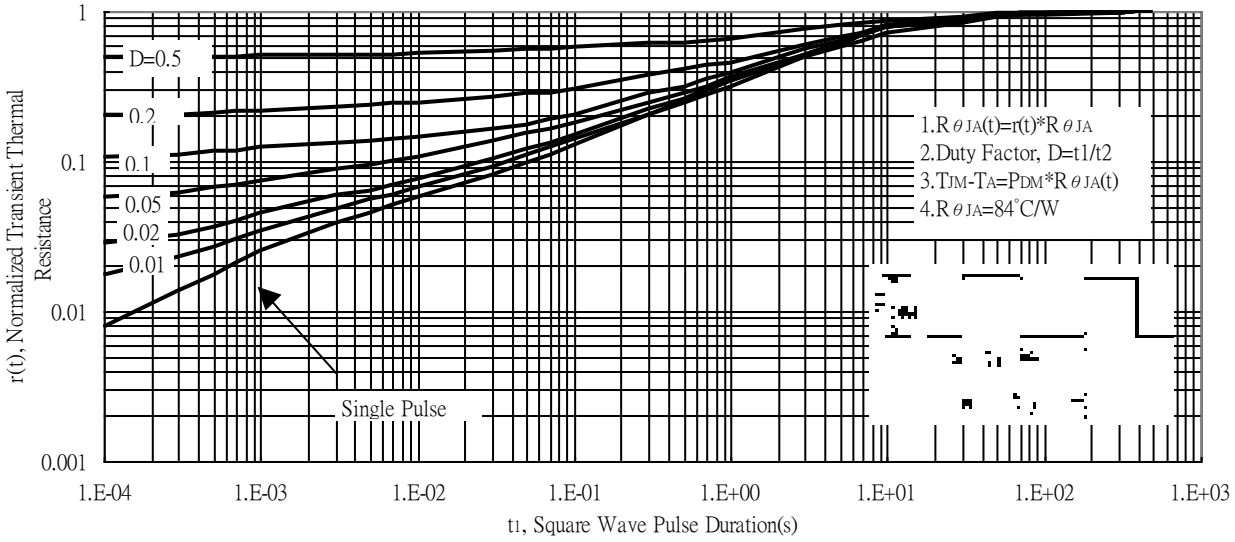
Typical Transfer Characteristics



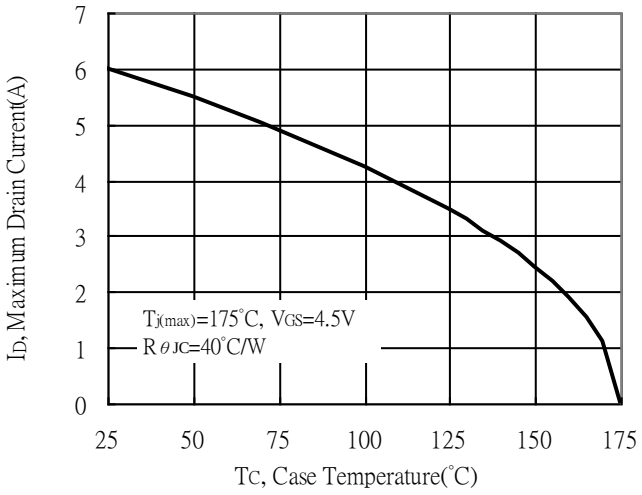
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



Transient Thermal Response Curves

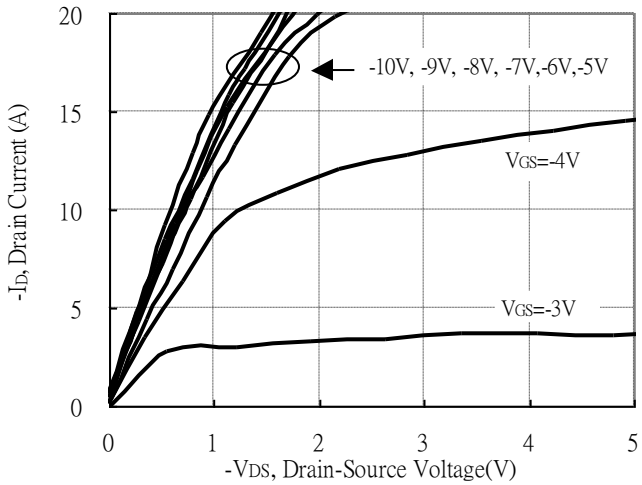


Maximum Drain Current vs Case Temperature

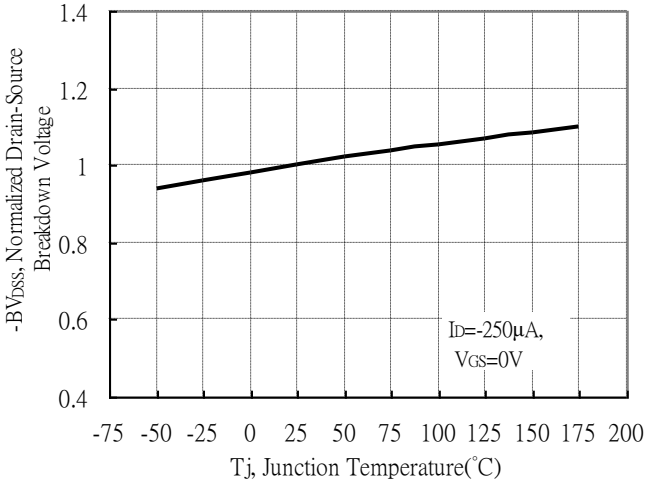


Typical Characteristics : Q2(P-channel)

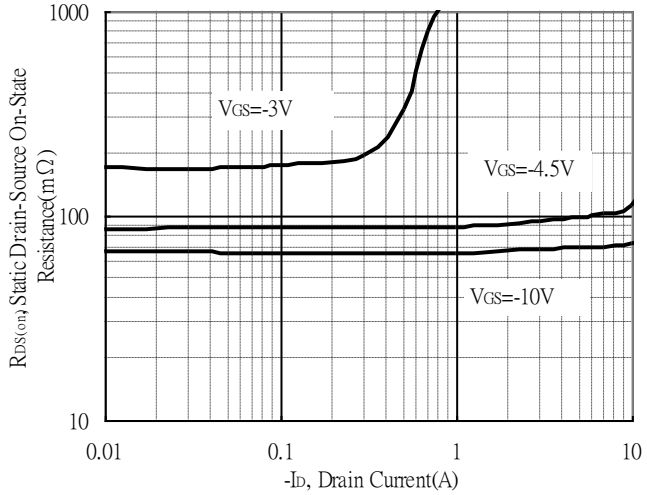
Typical Output Characteristics



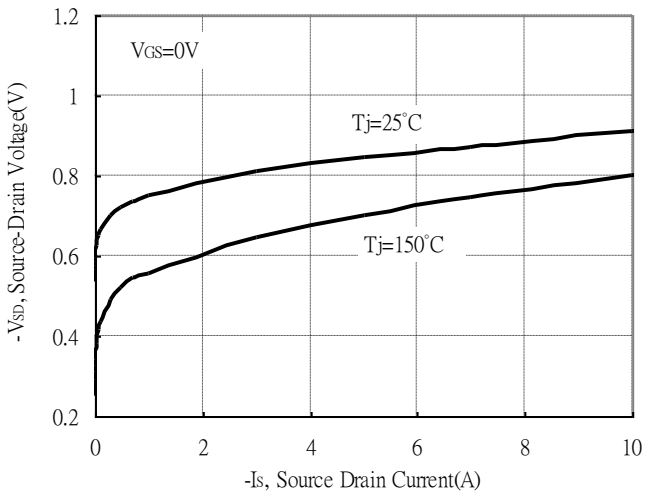
Brekdown Voltage vs Ambient Temperature



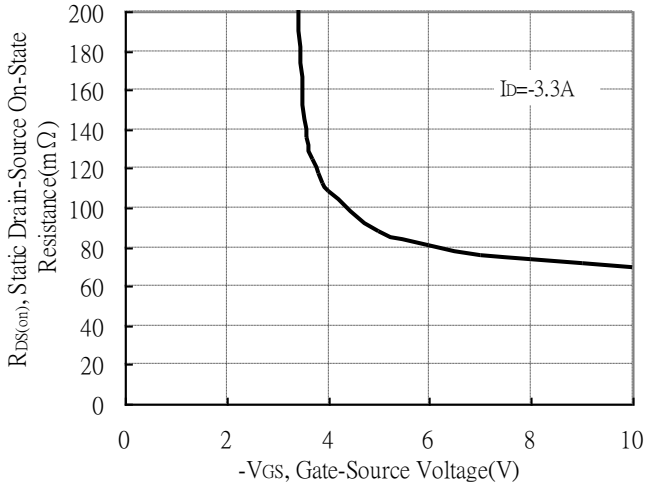
Static Drain-Source On-State resistance vs Drain Current



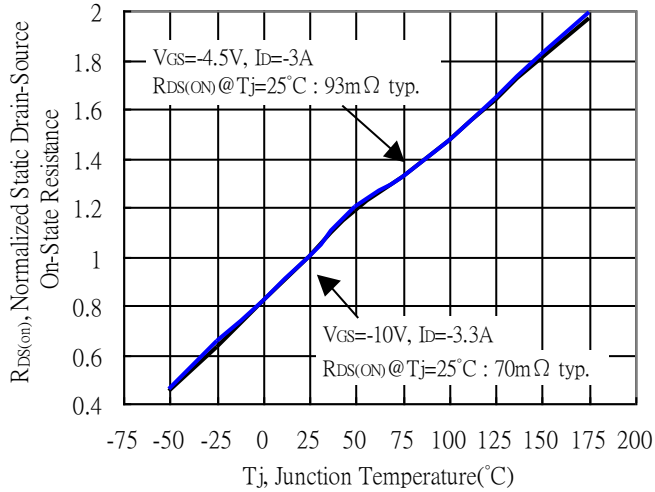
Source Drain Current vs Source-Drain Voltage



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

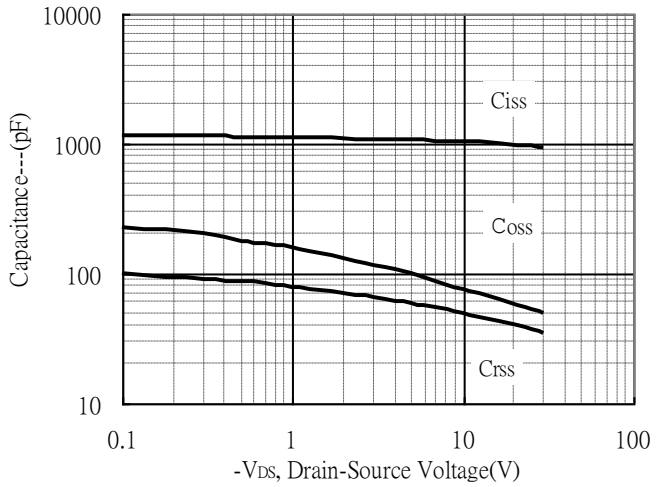


Drain-Source On-State Resistance vs Junction Tempearture

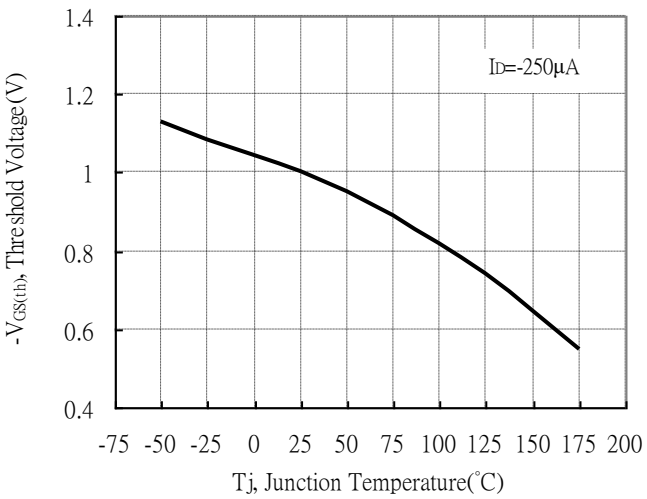


Typical Characteristics(Cont.) : Q2(P-channel)

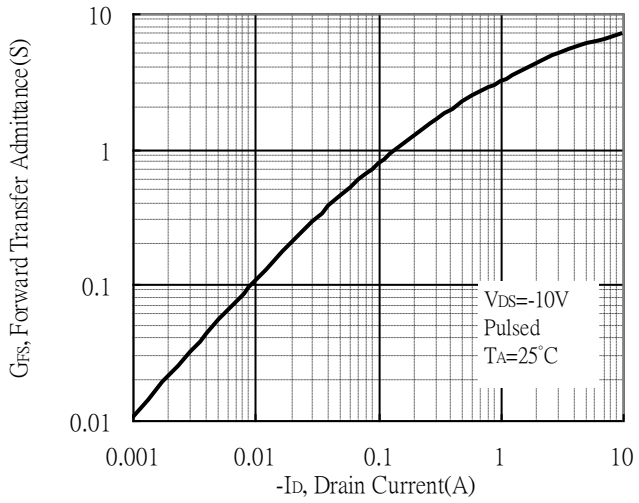
Capacitance vs Drain-to-Source Voltage



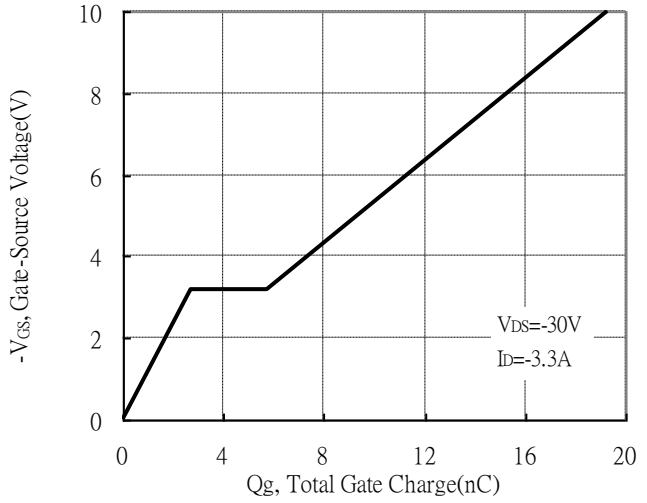
Threshold Voltage vs Junction Tempearture



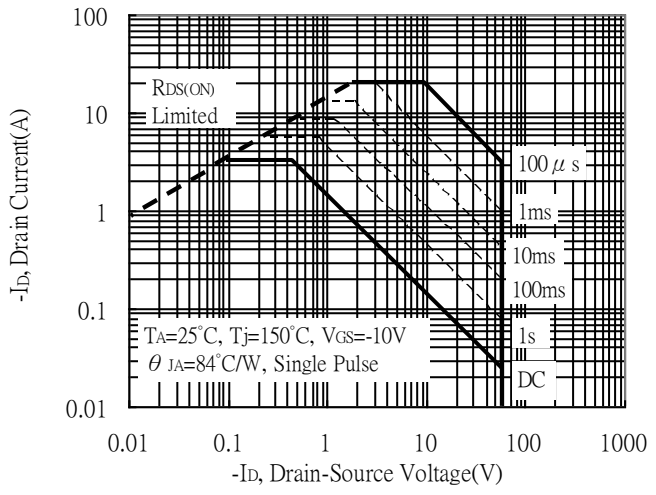
Forward Transfer Admittance vs Drain Current



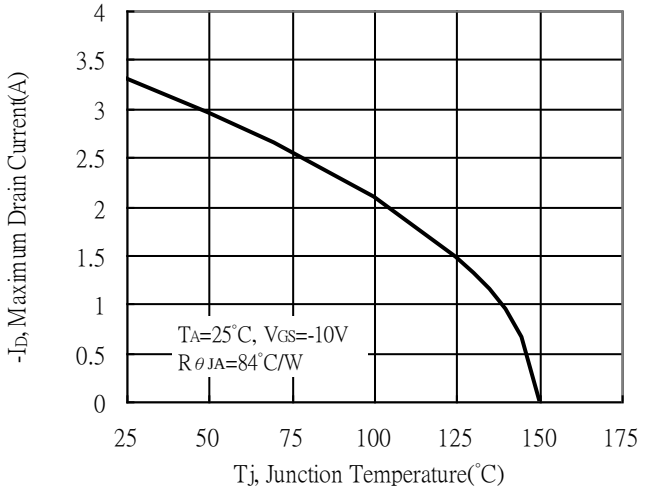
Gate Charge Characteristics



Maximum Safe Operating Area

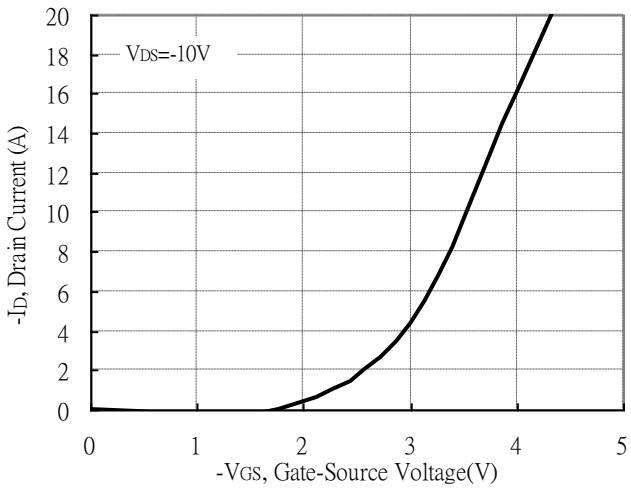


Maximum Drain Current vs Junction Temperature

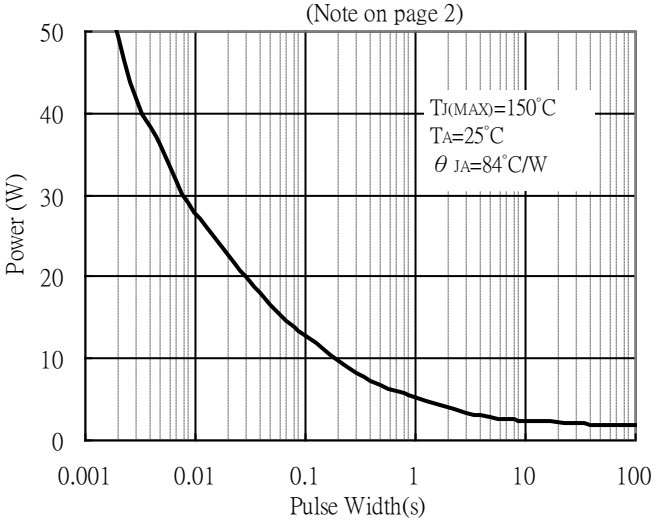


Typical Characteristics(Cont.) : Q2(P-channel)

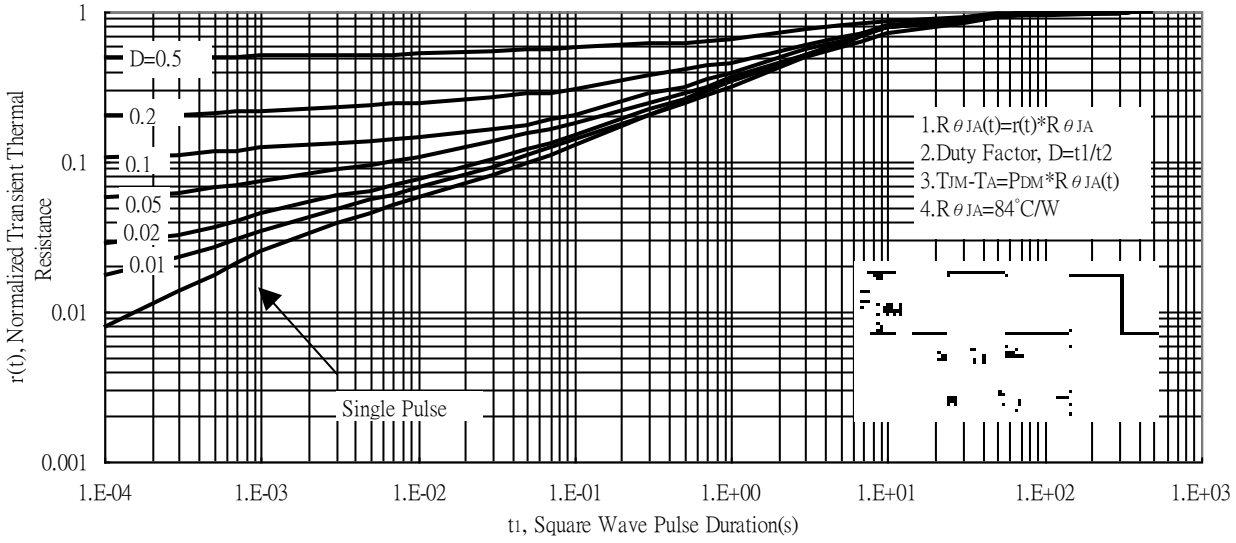
Typical Transfer Characteristics



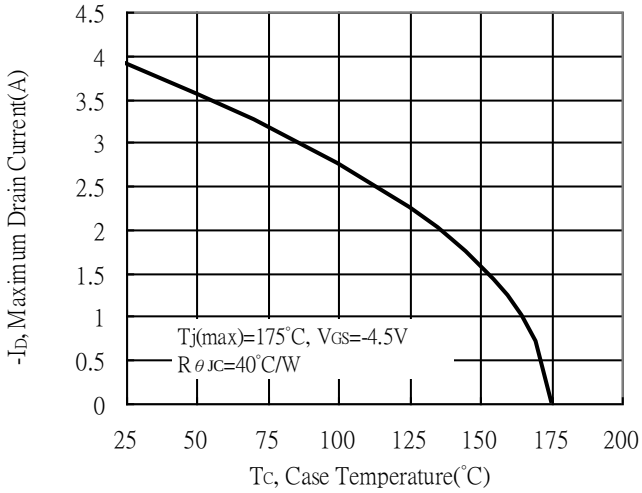
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



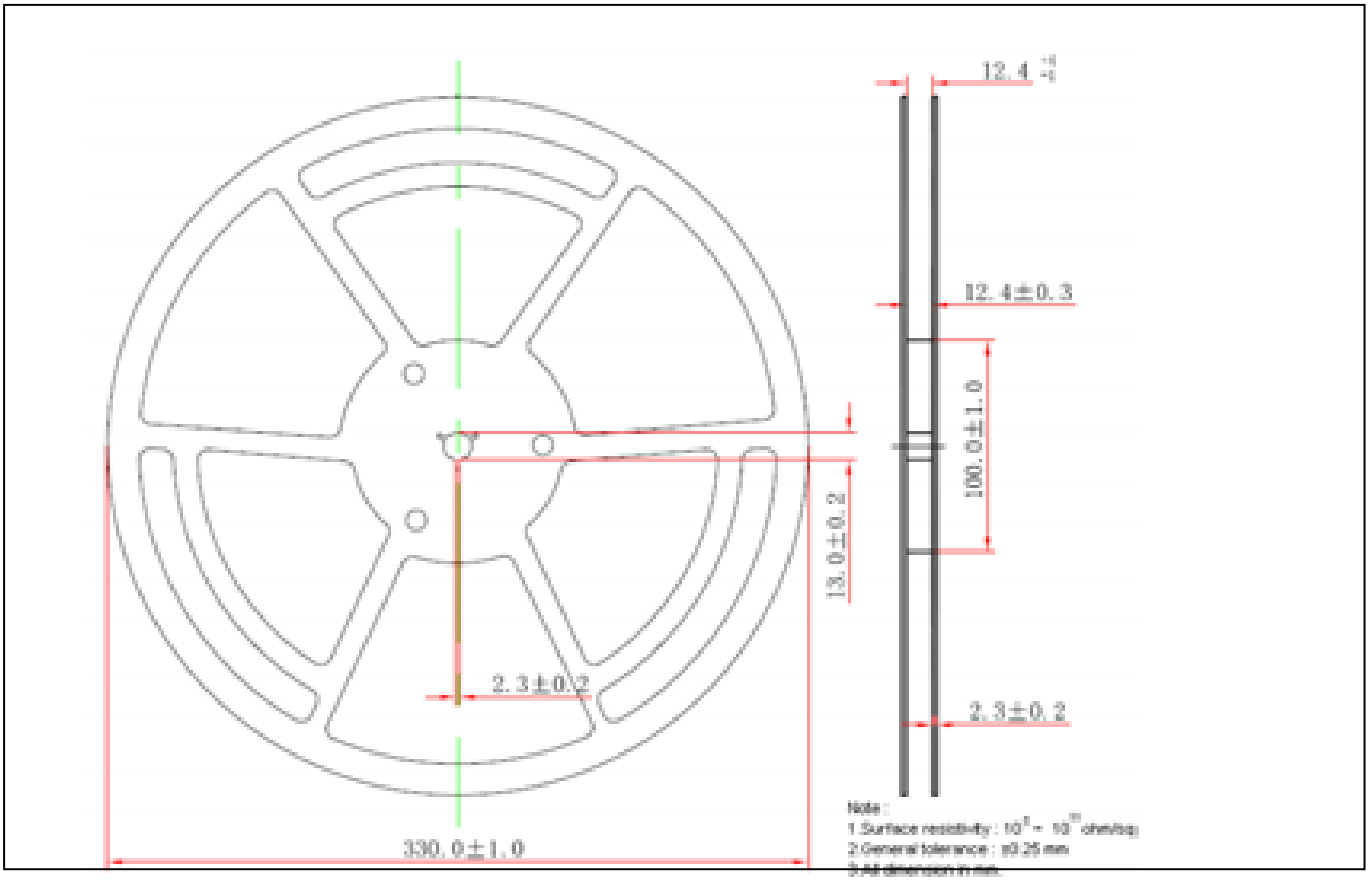
Transient Thermal Response Curves



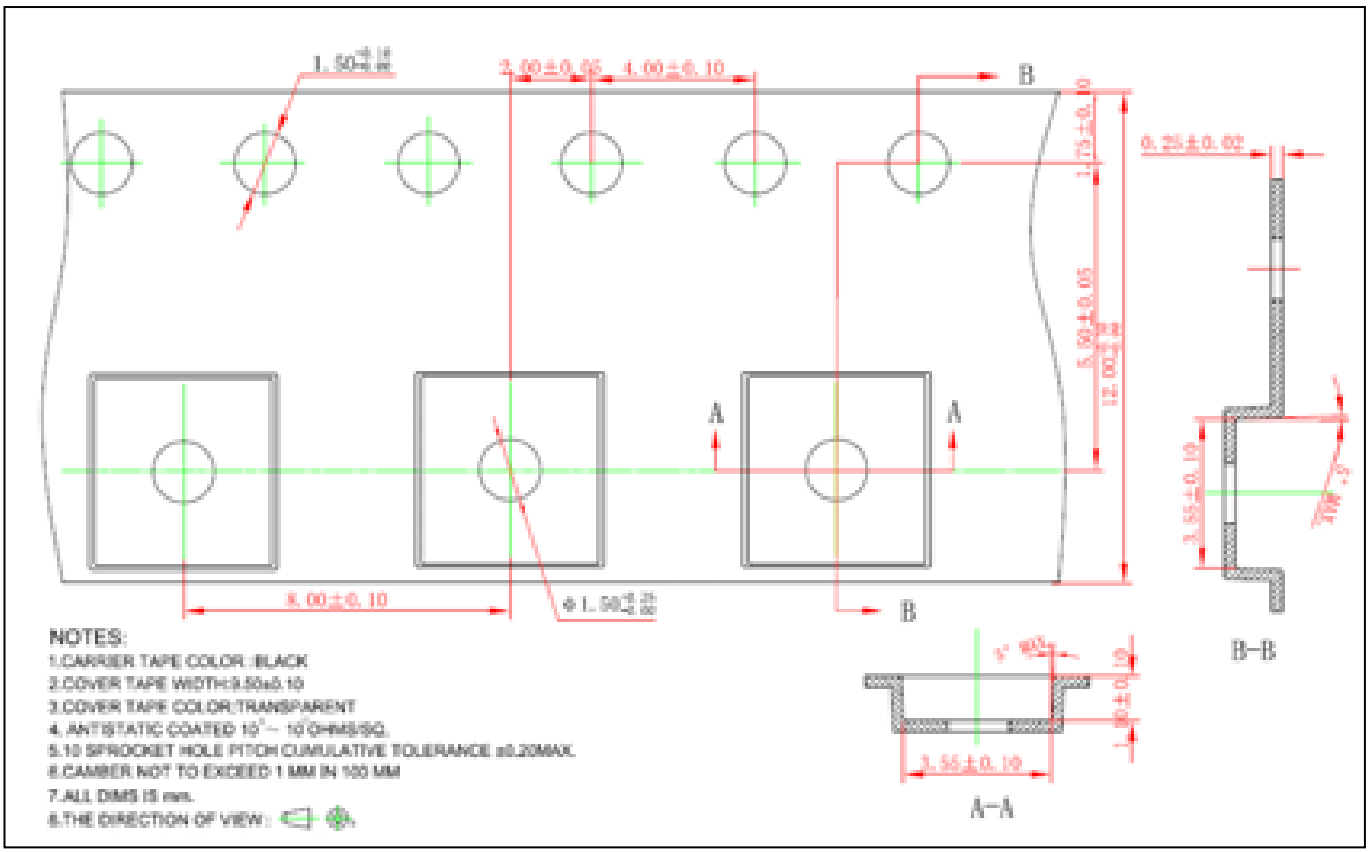
Maximum Drain Current vs Case Temperature



Reel Dimension



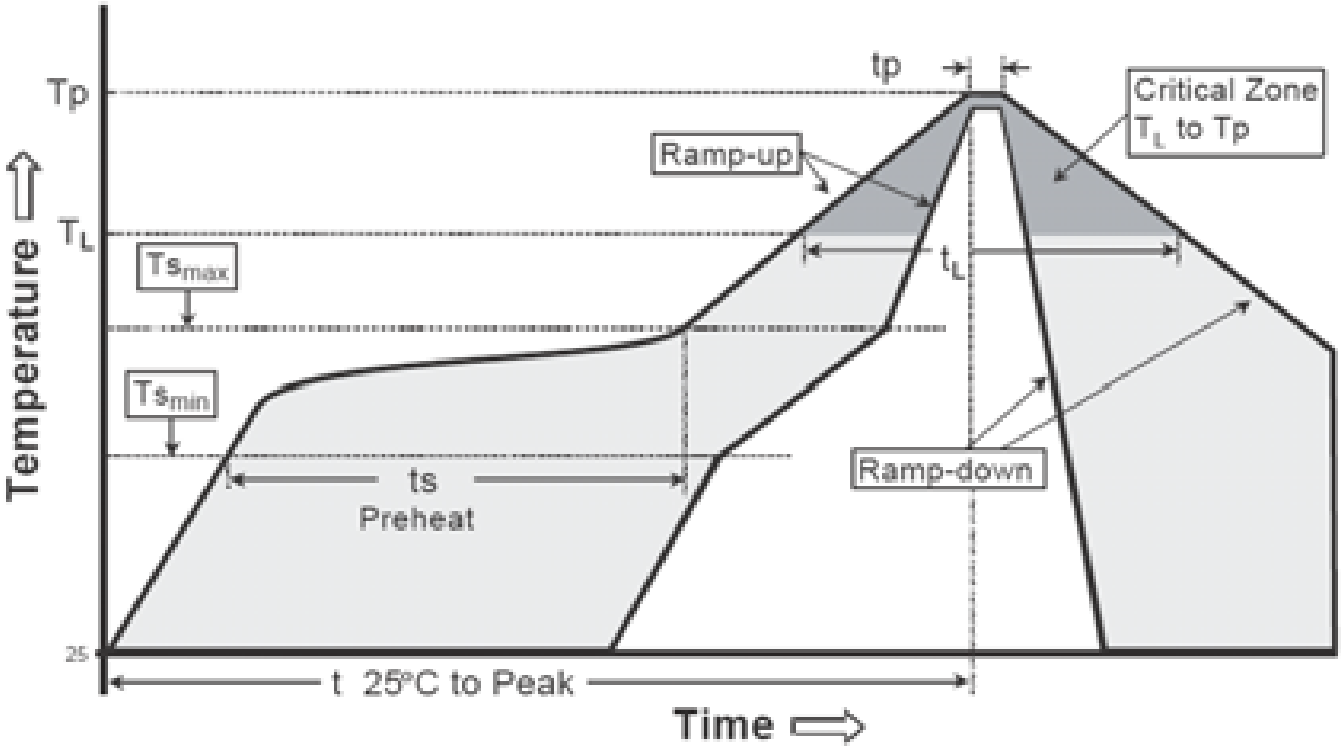
Carrier Tape Dimension



Recommended wave soldering condition

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

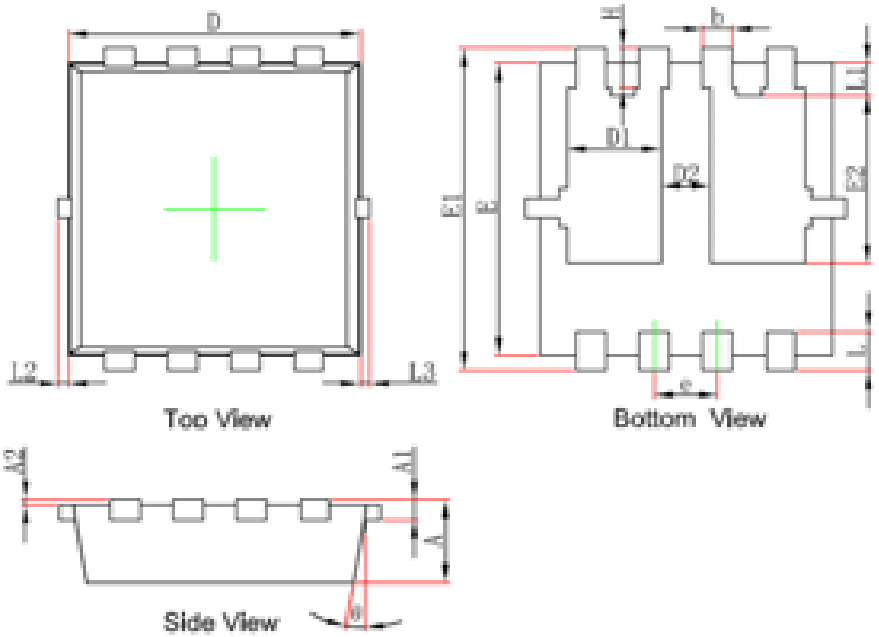
Recommended temperature profile for IR reflow



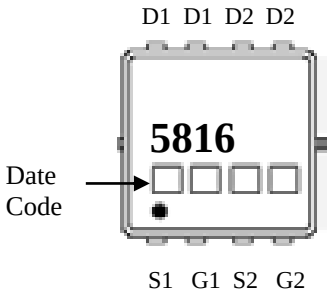
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L)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

DFN3x3 Dimension



Marking:



8-Lead DFN3x3 Plastic Package
Package Code: V8

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033	b	0.200	0.400	0.008	0.016
A1	0.152 REF		0.006 REF		e	0.550	0.750	0.022	0.030
A2	0.000	0.050	0.000	0.002	L	0.300	0.500	0.012	0.020
D	2.900	3.100	0.114	0.122	L1	0.180	0.480	0.007	0.019
D1	0.935	1.135	0.037	0.045	L2	0.000	0.100	0.000	0.004
D2	0.280	0.480	0.011	0.019	L3	0.000	0.100	0.000	0.004
E	2.900	3.100	0.114	0.122	H	0.315	0.515	0.012	0.020
E1	3.150	3.450	0.124	0.136	θ	9°	13°	9°	13°
E2	1.535	1.935	0.060	0.076					

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.