

N- AND P-Channel Enhancement Mode MOSFET

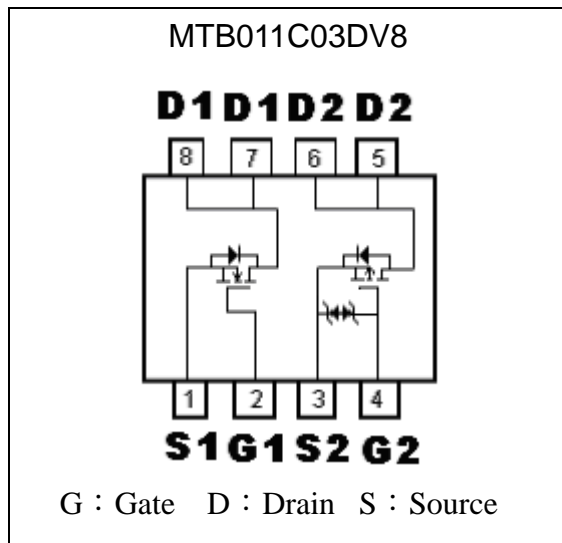
MTB011C03DV8

	N-CH	P-CH
BV_{DSS}	30V	-30V
I_D @ $T_C=25\text{ }^\circ\text{C}$, $V_{GS}=10\text{V}(-10\text{V})$	23.9A	-17.3A
I_D @ $T_A=25\text{ }^\circ\text{C}$, $V_{GS}=10\text{V}(-10\text{V})$	9.4A	-6.8A
$R_{DS(on)}$ (typ.) @ $V_{GS}=10\text{V}(-10\text{V})$	9.3m Ω	20.8m Ω
$R_{DS(on)}$ (typ.) @ $V_{GS}=5\text{V}(-5\text{V})$	12.4m Ω	33m Ω

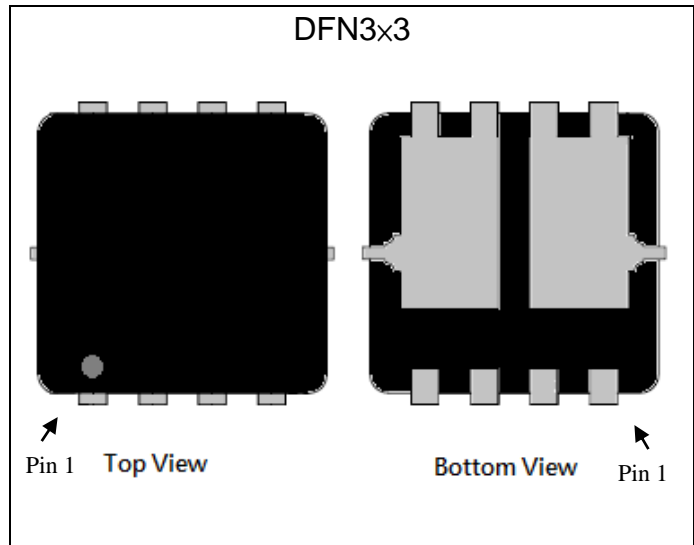
Features

- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- ESD protected gate design adopted in P-MOS
- Pb-free lead plating and halogen-free package

Equivalent Circuit

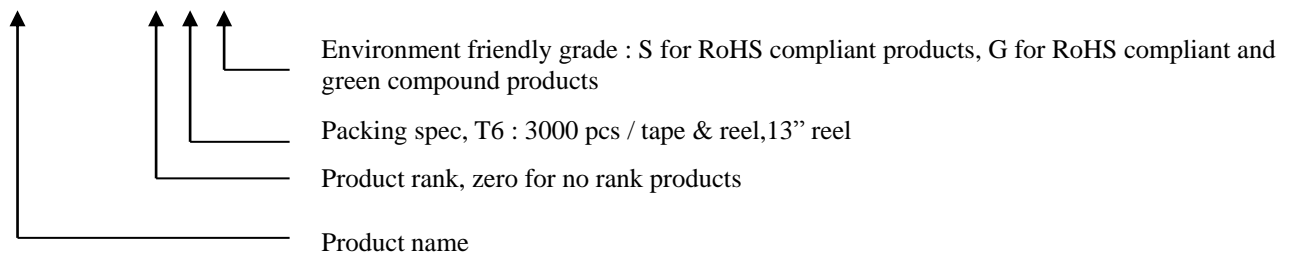


Outline



Ordering Information

Device	Package	Shipping
MTB011C03DV8-0-T6-G	DFN3x3 (Pb-free lead plating and halogen-free package)	3000 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}	30	-30	V
Gate-Source Voltage		V _{GS}	±20	±20	
Continuous Drain Current	T _A =25 °C, V _{GS} =10V (-10V) *2	I _{DSM}	9.4	-6.8	A
	T _A =70 °C, V _{GS} =10V (-10V) *2		7.5	-5.4	
	T _A =25 °C, V _{GS} =10V (-10V)		7.5	-5.5	
	T _A =70 °C, V _{GS} =10V (-10V)		6	-4.4	
Continuous Drain Current	T _C =25 °C, V _{GS} =10V (-10V)	I _D	23.9	-17.3	
	T _C =100 °C, V _{GS} =10V (-10V)		15.1	-10.9	
Pulsed Drain Current * 1		I _{DM}	40	-35	
Single Pulse Avalanche Current @ L=0.1mH		I _{AS}	24	-26	
Single Pulse Avalanche Energy @ L=1mH *3		E _{AS}	50	72	mJ
Total Power Dissipation	T _A =25°C, t<10s	P _{DSM}	2.7	2.7	W
	T _A =70°C, t<10s		1.7	1.7	
	T _A =25°C, steady state		1.8	1.8	
	T _A =70°C, steady state		1.2	1.2	
	T _C =25°C	P _D	18	18	
	T _C =100°C		7.2	7.2	
Operating Junction and Storage Temperature Range		T _j ; T _{stg}	-55~+150		°C

Thermal Data

Parameter	Symbol	N-Channel	P-Channel	Unit
Max. Thermal Resistance, Junction-to-ambient, t<10s	R _{th,j-a}	45	45	°C/W
Max. Thermal Resistance, Junction-to-ambient, steady state		70	69	
Max. Thermal Resistance, Junction-to-case	R _{th,j-c}	7	7	

- Note : 1. Pulse width limited by maximum junction temperature.
 2. Surface mounted on a 1 in² pad of 2oz copper, t≤10s. In practice R_{th,j-a} will be determined by customer's PCB characteristics. 216°C/W when mounted on a minimum pad of 2 oz. copper.
 3. 100% tested by conditions of L=0.1mH, V_{DS}=15V, V_{GS}=10V, I_{AS}=6A for N-MOS and L=0.1mH, V_{DS}=-15V, I_{AS}=-6A, V_{GS}=-10V For P-MOS

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	30	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	1.5	-	2.5		V _{DS} = V _{GS} , I _D =250μA
G _{FS} *1	-	9.7	-	S	V _{DS} =10V, I _D =5A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =30V, V _{GS} =0V
	-	-	25		V _{DS} =24V, V _{GS} =0V, T _j =70°C
R _{DS(ON)} *1	-	9.3	13.5	mΩ	V _{GS} =10V, I _D =6A
	-	12.4	17.5		V _{GS} =5V, I _D =4A



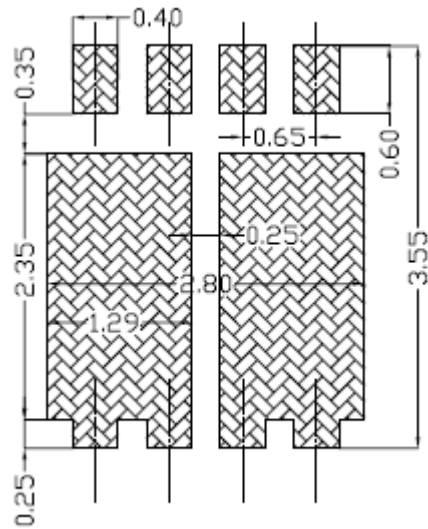
Dynamic					
Ciss	-	751	-	pF	V _{DS} =15V, V _{GS} =0V, f=1MHz
Coss	-	169	-		
Crss	-	92	-		
Qg *1, 2	-	15	-	nC	V _{DS} =15V, V _{GS} =10V, I _D =6A
Qgs *1, 2	-	2.6	-		
Qgd *1, 2	-	3.4	-		
td(ON) *1, 2	-	9	-	ns	V _{DS} =15V, I _D =6A, V _{GS} =10V, R _{GS} =1 Ω
tr *1, 2	-	14.6	-		
td(OFF) *1, 2	-	31.4	-		
tf *1, 2	-	10	-		
Rg	-	2	-	Ω	f=1MHz
Source-Drain Diode					
I _S *1	-	-	2.3	A	
I _{SM} *3	-	-	9.2		
V _{SD} *1	-	0.78	1.2	V	I _S =6A, V _{GS} =0V
t _{rr}	-	11	-	ns	I _F =6A, dI _F /dt=100A/μs
Q _{rr}	-	4.6	-	nC	

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-30	-	-	V	V _{GS} =0V, I _D =-250μA
V _{GS(th)}	-1.5	-	-2.5		V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±10	μA	V _{GS} =±16V, V _{DS} =0V
I _{DSS}	-	-	-1		V _{DS} =-30V, V _{GS} =0V
	-	-	-25		V _{DS} =-24V, V _{GS} =0V, T _J =70°C
*R _{Ds(ON)}	-	20.8	28	mΩ	V _{GS} =-10V, I _D =-6A
	-	33	46		V _{GS} =-5V, I _D =-4A
*G _{FS}	-	11.4	-	S	V _{DS} =-10V, I _D =-5A
Dynamic					
Ciss	-	1036	-	pF	V _{DS} =-15V, V _{GS} =0V, f=1MHz
Coss	-	211	-		
Crss	-	161	-		
*td(ON)	-	7	-	ns	V _{DS} =-15V, I _D =-1A, V _{GS} =-10V, R _{GS} =6 Ω
*tr	-	9	-		
*td(OFF)	-	63	-		
*tf	-	25.4	-		
*Qg	-	21.2	-	nC	V _{DS} =-15V, I _D =-6A, V _{GS} =-10V
*Qgs	-	2.9	-		
*Qgd	-	4.8	-		
Rg	-	8.7	-	Ω	f=1MHz
Body Diode					
*I _S	-	-	-2.3	A	
*I _{SM}	-	-	-9.2		
*V _{SD}	-	-0.83	-1.2	V	V _{GS} =0V, I _S =-6A
*t _{rr}	-	10.7	-	ns	I _F =-5A, V _{GS} =0V, dI _F /dt=100A/μs
*Q _{rr}	-	4.1	-	nC	

Note : *1.Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

Recommended Soldering Footprint

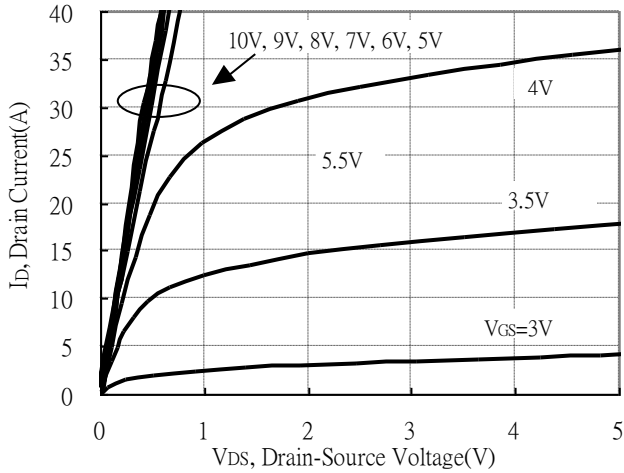


unit : mm

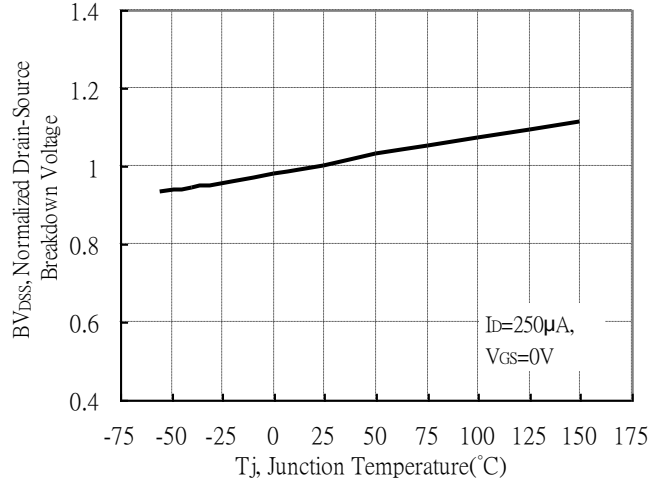


Typical Characteristics : Q1(N-channel)

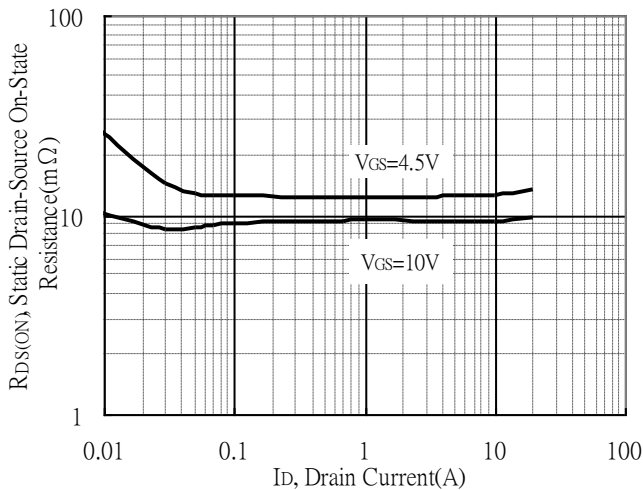
Typical Output Characteristics



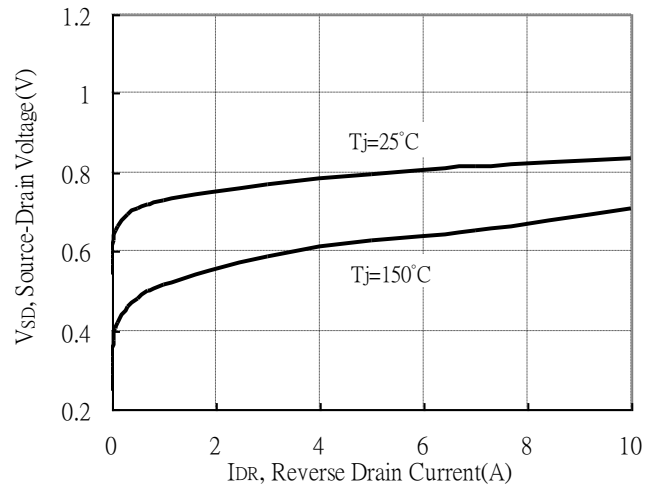
Brekdown Voltage vs Ambient Temperature



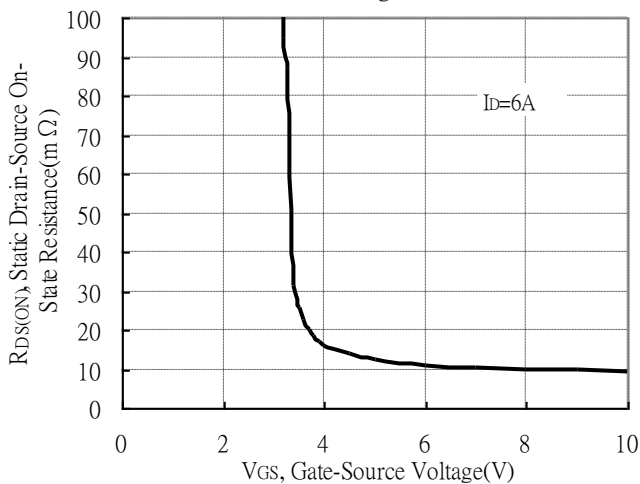
Static Drain-Source On-State resistance vs Drain Current



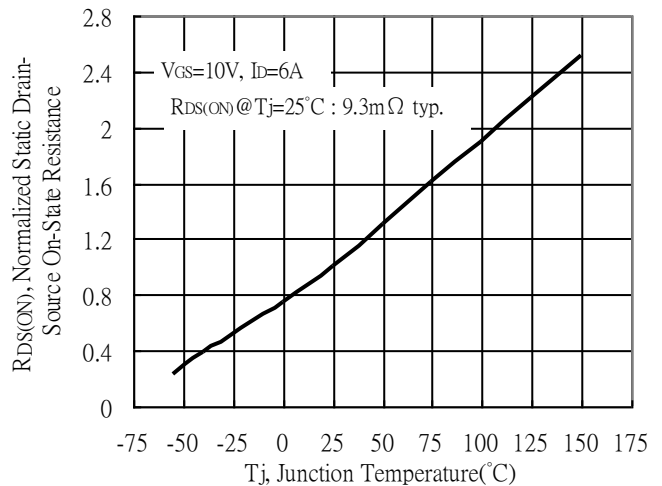
Reverse Drain Current vs Source-Drain Voltage



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



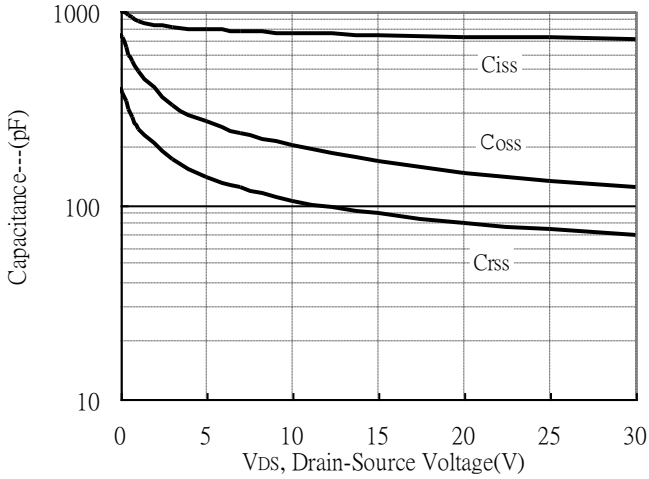
Drain-Source On-State Resistance vs Junction Temperature



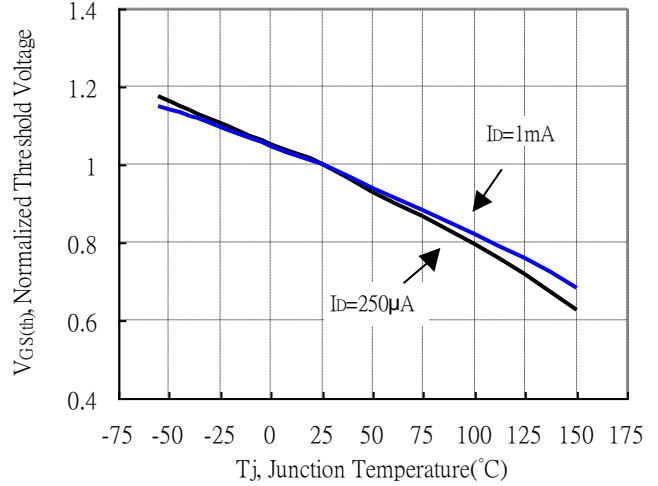


Typical Characteristics(Cont.) : Q1(N-channel)

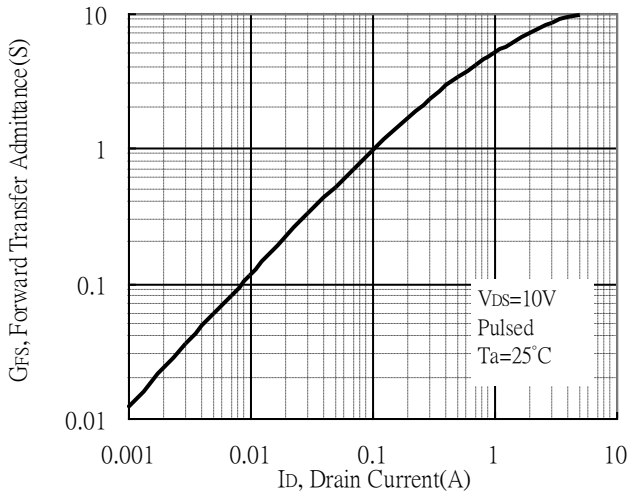
Capacitance vs Drain-to-Source Voltage



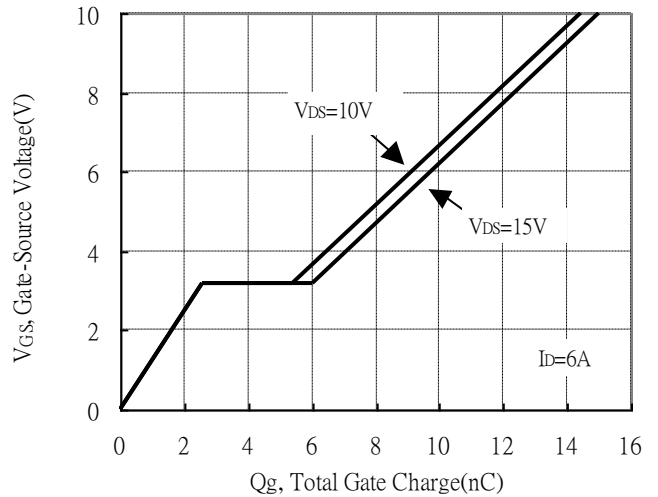
Threshold Voltage vs Junction Temperature



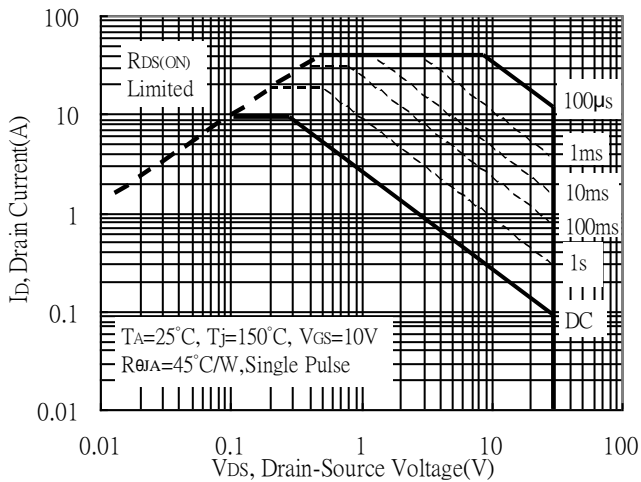
Forward Transfer Admittance vs Drain Current



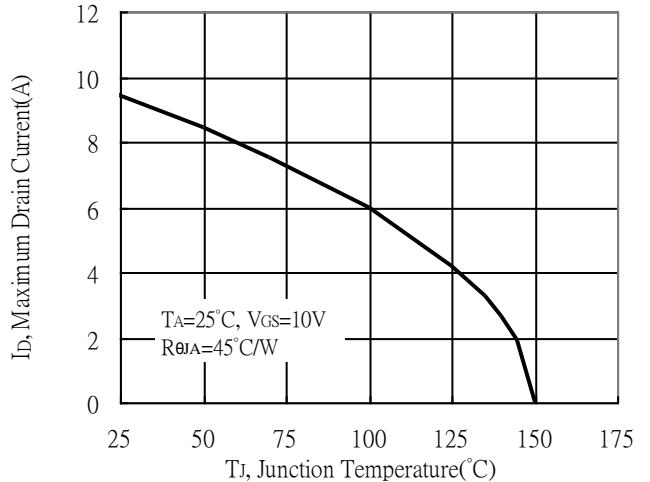
Gate Charge Characteristics



Maximum Safe Operating Area



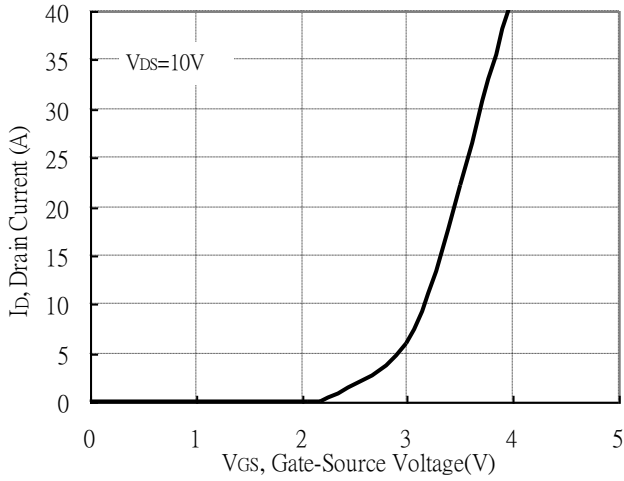
Maximum Drain Current vs Case Temperature



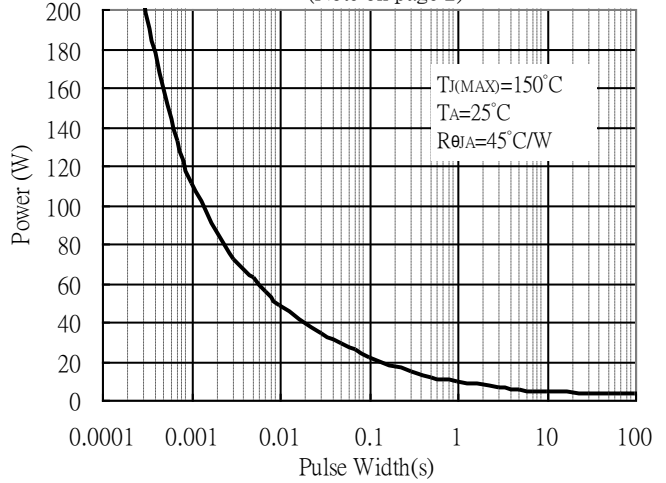


Typical Characteristics(Cont.) : Q1(N-channel)

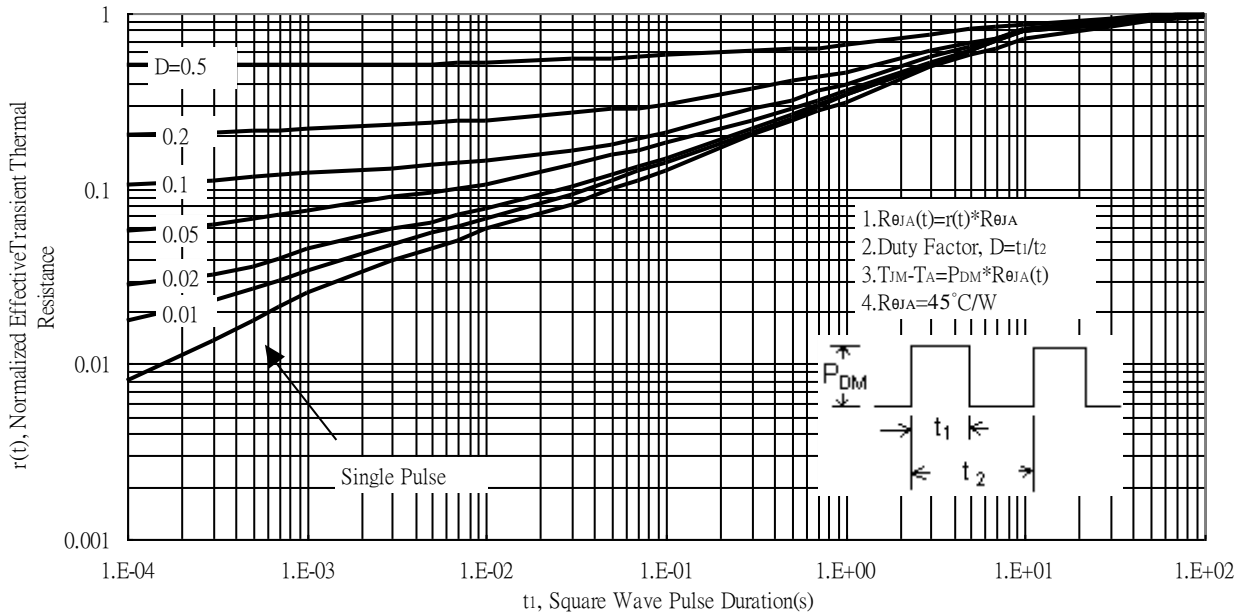
Typical Transfer Characteristics



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

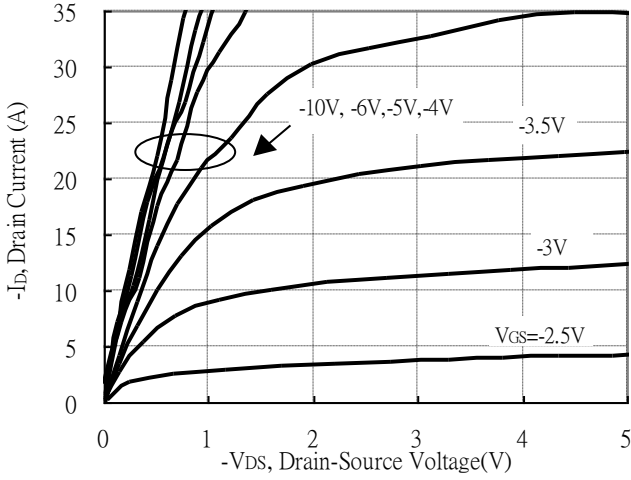


Transient Thermal Response Curves

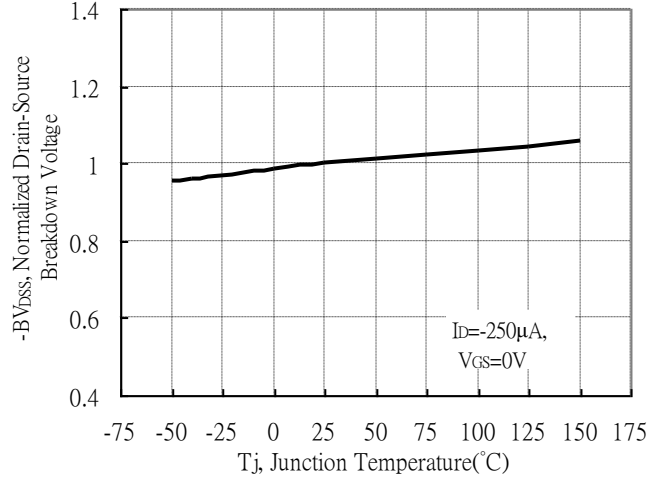


Typical Characteristics : Q2(P-channel)

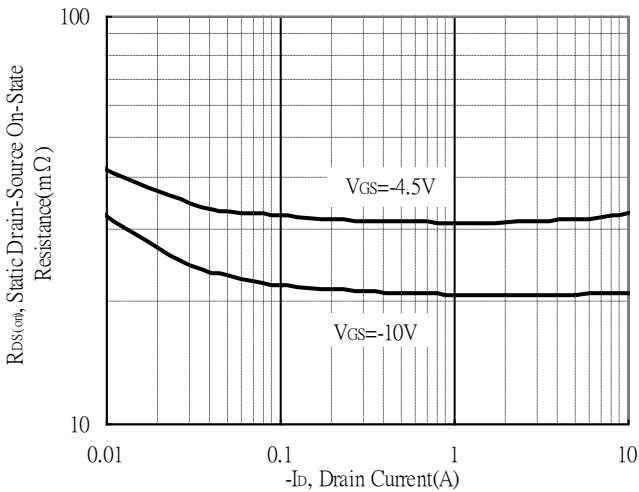
Typical Output Characteristics



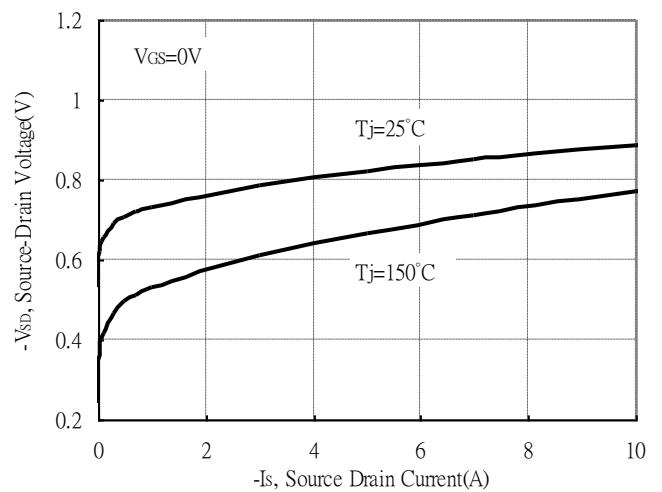
Brekdown Voltage vs Ambient Temperature



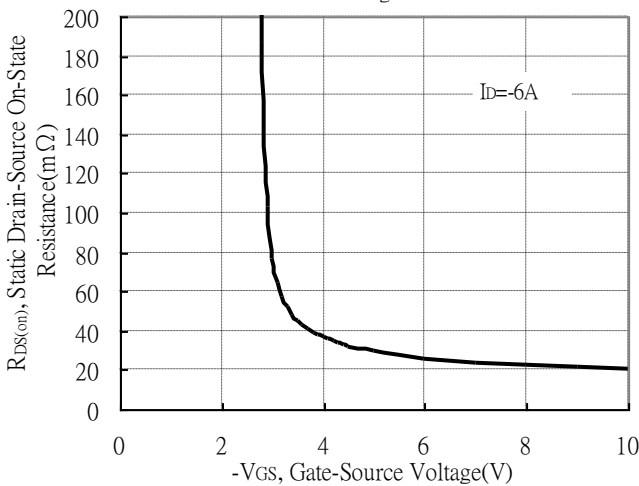
Static Drain-Source On-State resistance vs Drain Current



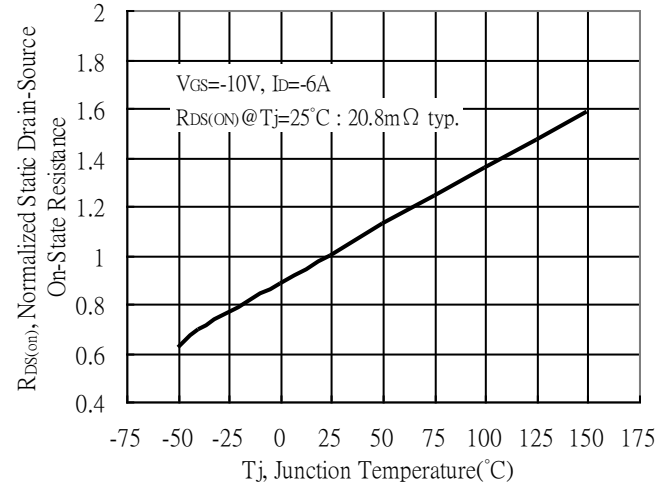
Source Drain Current vs Source-Drain Voltage



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



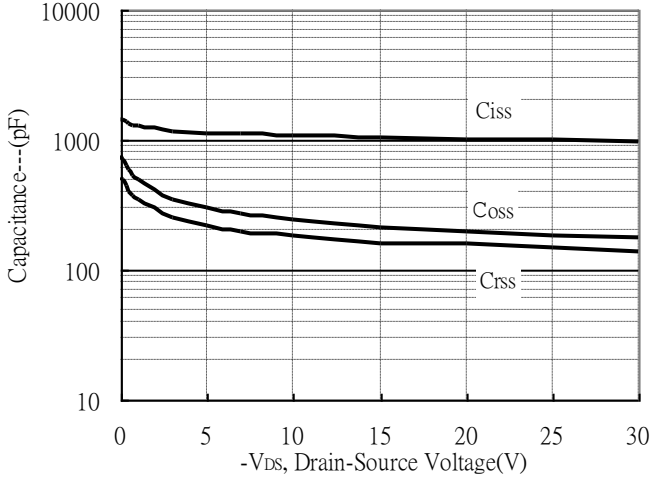
Drain-Source On-State Resistance vs Junction Temperature



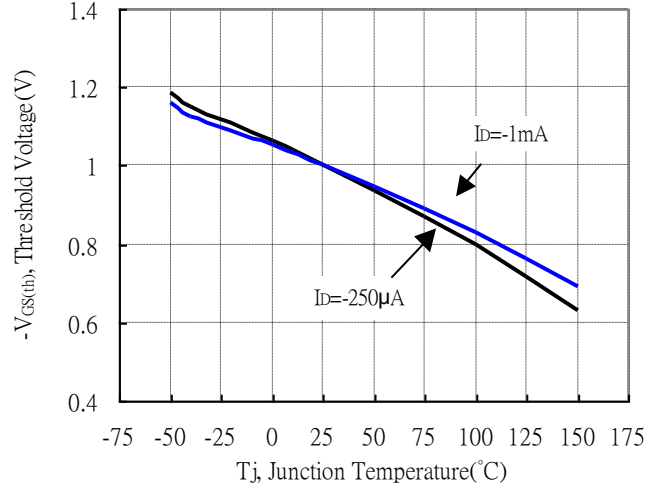


Typical Characteristics(Cont.) : Q2(P-channel)

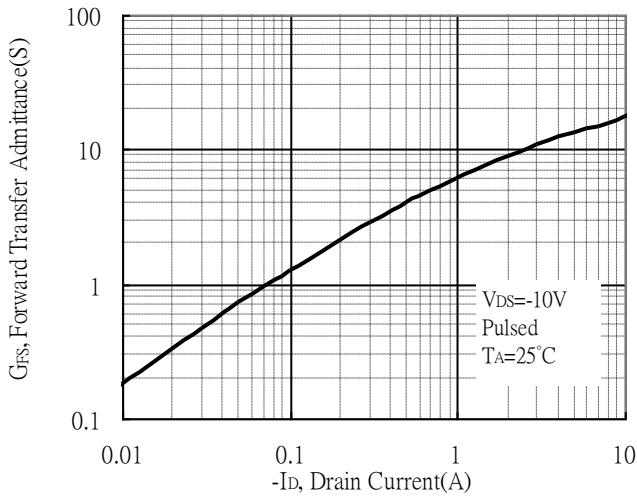
Capacitance vs Drain-to-Source Voltage



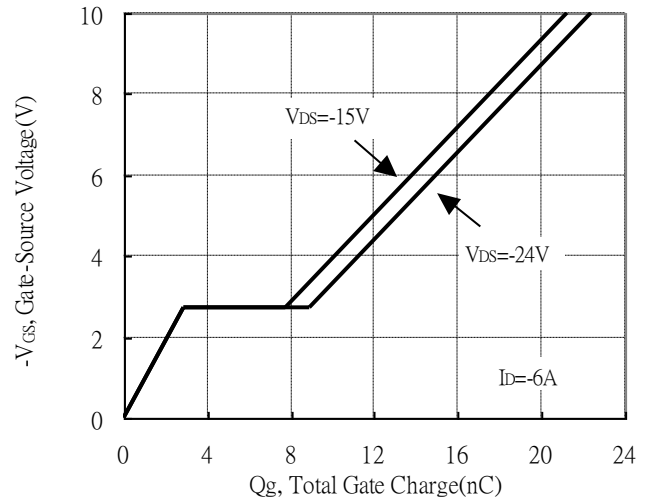
Threshold Voltage vs Junction Temperature



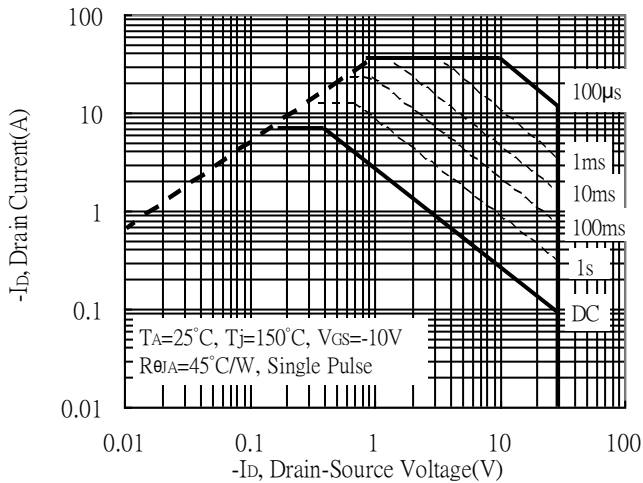
Forward Transfer Admittance vs Drain Current



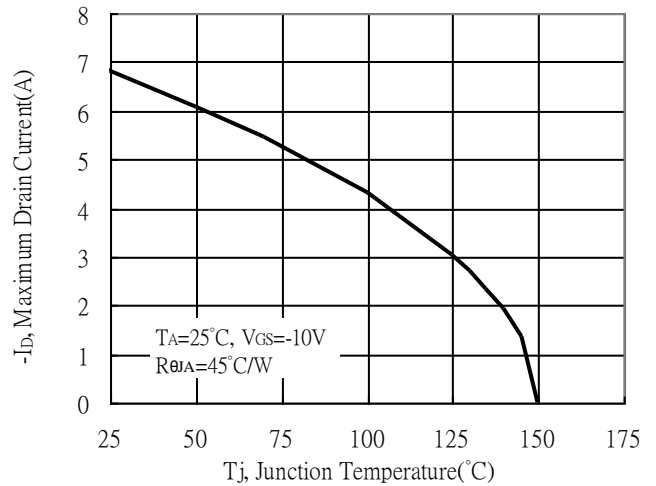
Gate Charge Characteristics



Maximum Safe Operating Area

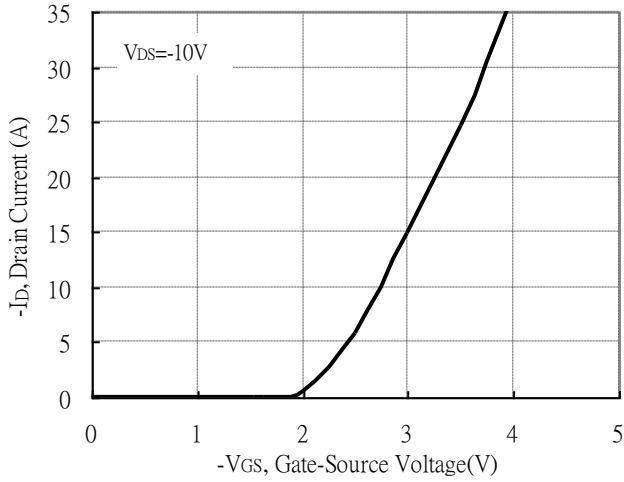


Maximum Drain Current vs Junction Temperature

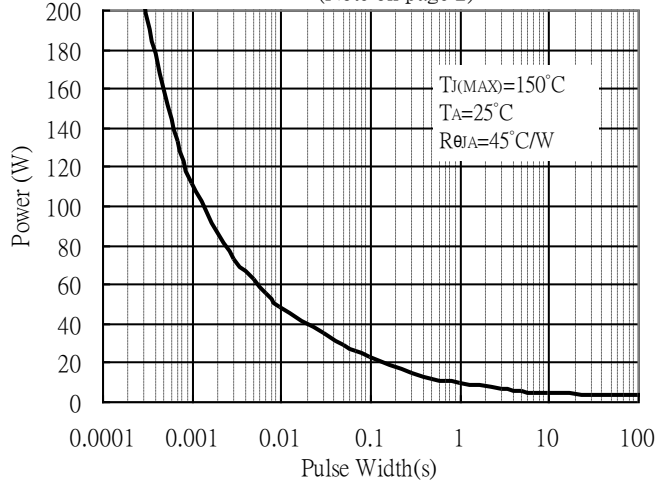


Typical Characteristics(Cont.) : Q2(P-channel)

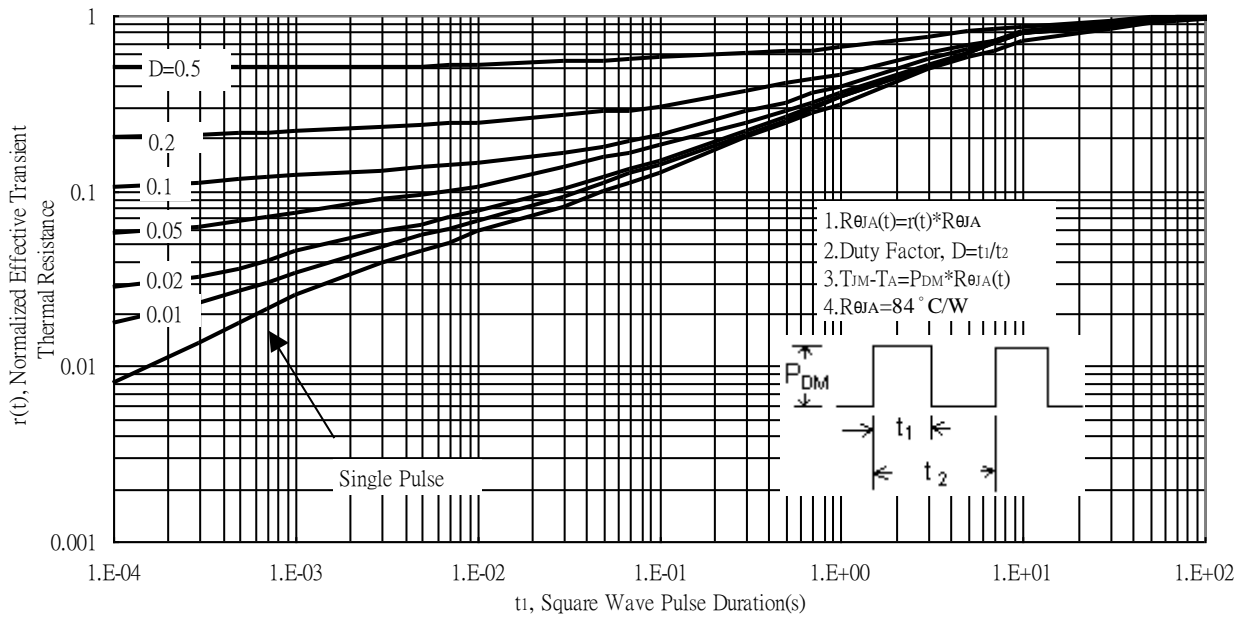
Typical Transfer Characteristics



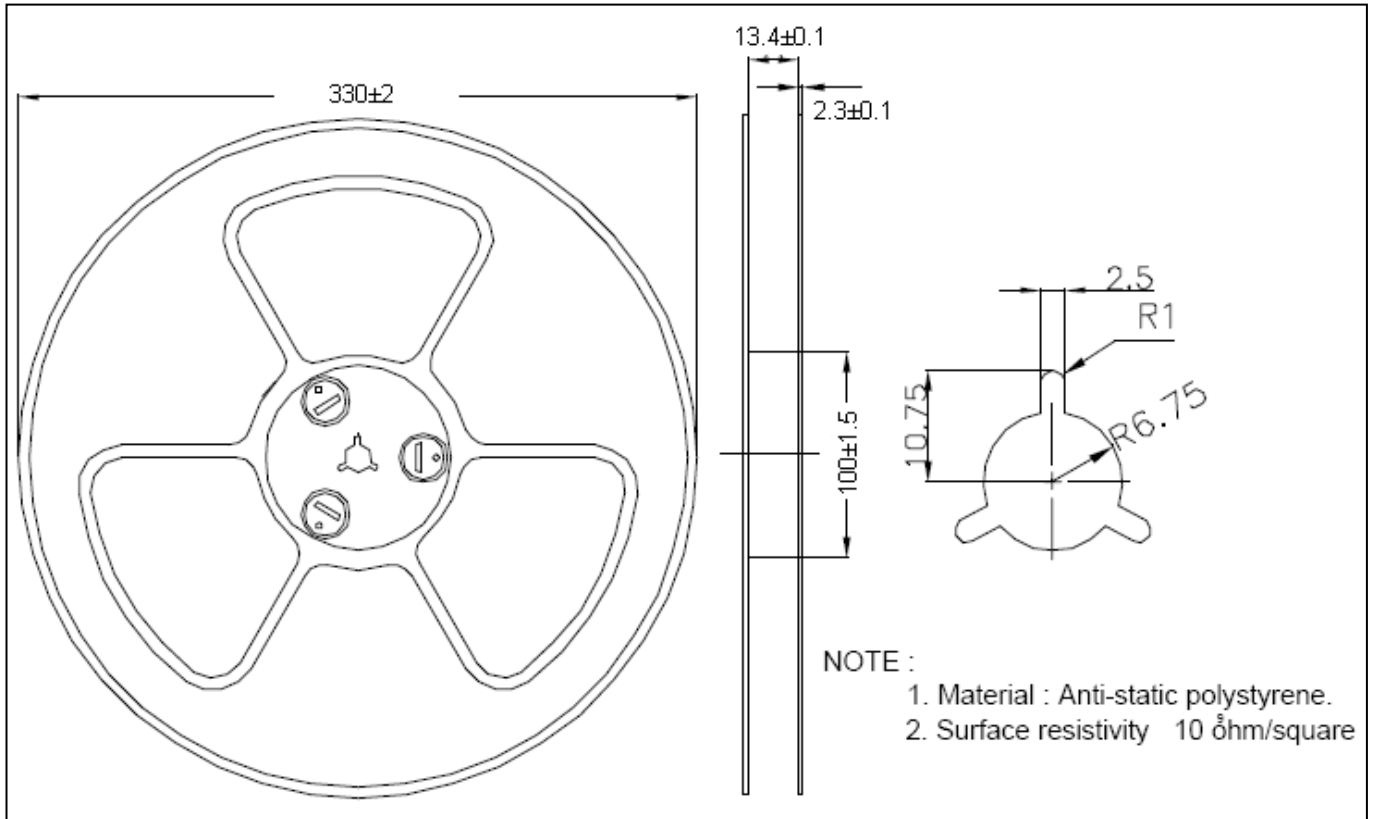
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



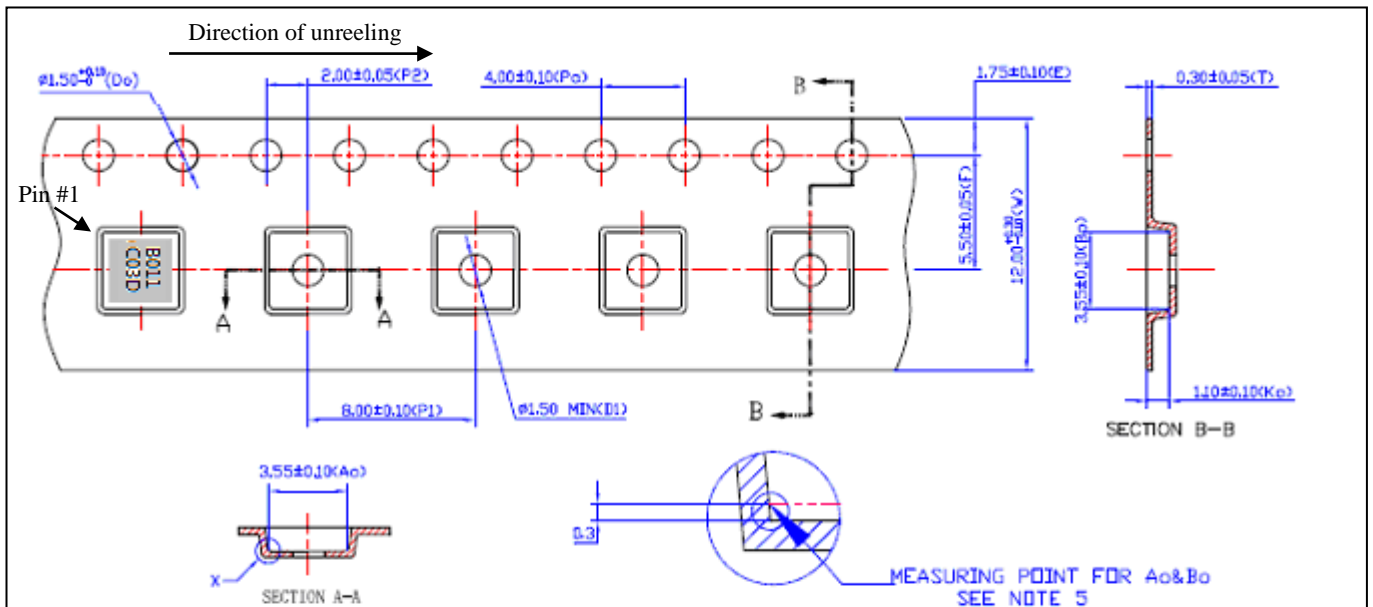
Transient Thermal Response Curves



Reel Dimension



Carrier Tape

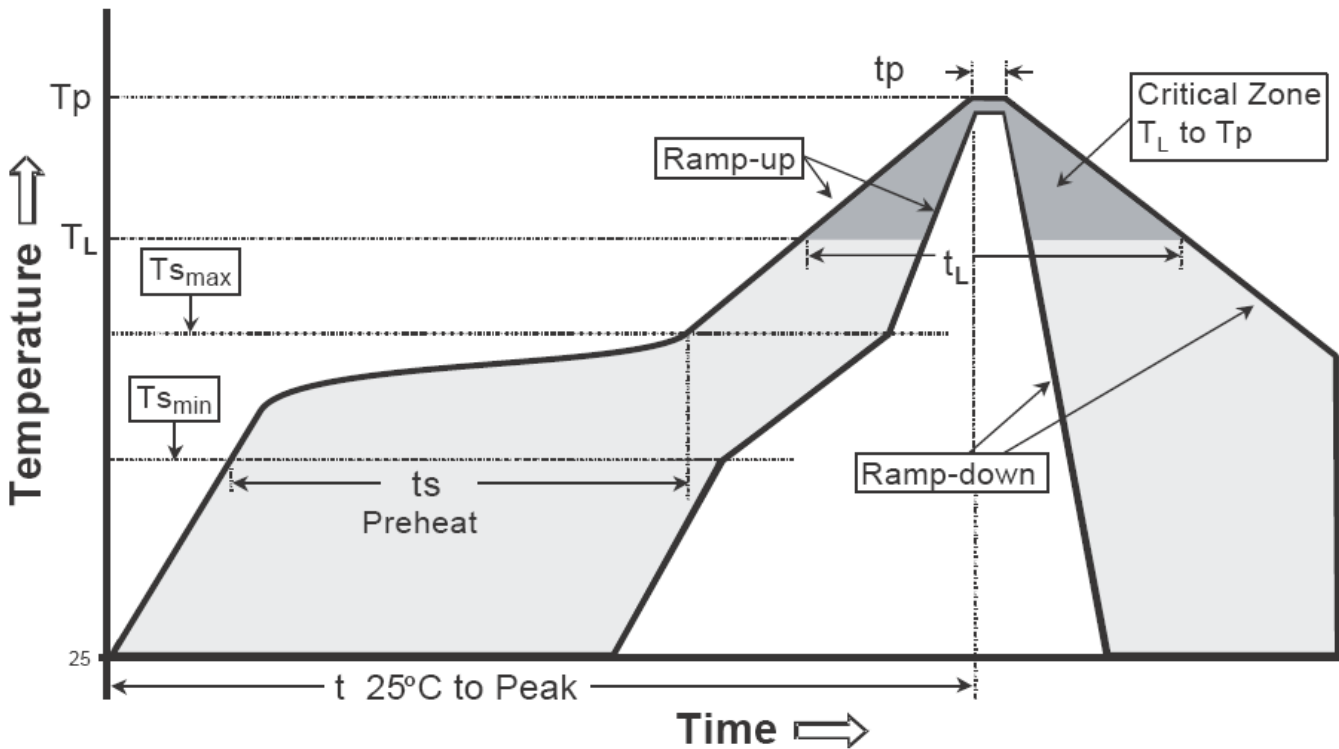


- Note :
- 1.10 sprocket hole pitch cumulative tolerance : $\pm 0.2\text{mm}$.
 - 2.Camber : Reference to carrier tape inspection manual.
 - 3.Material : black conductive polystyrene.
 - 4.All dimensions are in millimeters(unless otherwise specified).
 - 5.Ao and Bo measured on a plane 0.3mm above the bottom of the pocket.
 - 6.Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
 - 7.Pocket position relative to sprocket hole measured as true position of the pocket, not pocket hole.
 - 8.Surface resistivity : $1 \times 10^4 \sim 1 \times 10^{11}$ ohms/sq

Recommended wave soldering condition

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

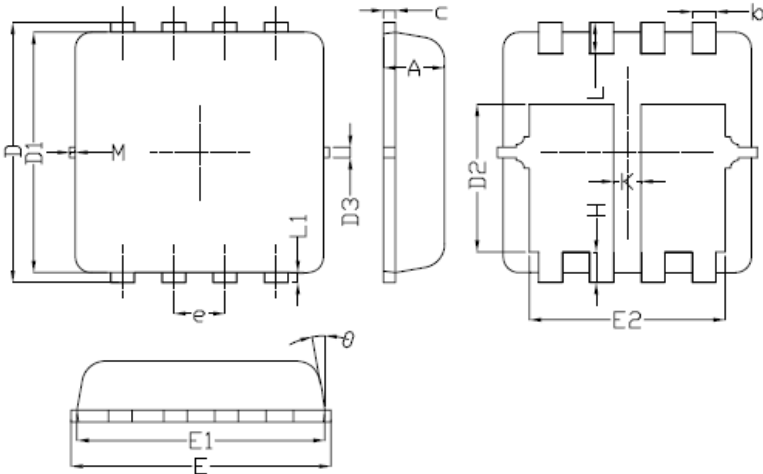
Recommended temperature profile for IR reflow



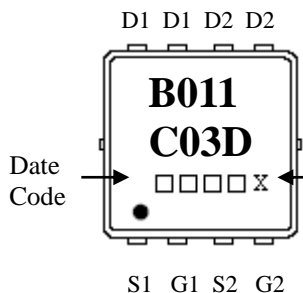
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above: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



Assembly site code:
 blank→site 1
 G→site 2

Note:

- All Dimension Are In mm.
- Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
- Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.

Date Code(counting from left to right) :

1st code: year code, the last digit of Christian year
 2nd code : month code, Jan→A, Feb→B, Mar→C, Apr→D
 May→E, Jun→F, Jul→G, Aug→H, Sep→J,
 Oct→K, Nov→L, Dec→M
 3rd and 4th codes : production serial number, 01~99

**8-Lead DFN3x3 Plastic Package
 CYStek Package Code: V8**

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.65	0.85	0.026	0.033	E2	2.30	2.60	0.091	0.102
b	0.20	0.40	0.008	0.016	e	0.65 BSC		0.026 BSC	
c	0.10	0.25	0.004	0.010	H	0.30	0.50	0.012	0.020
D	3.15	3.45	0.124	0.136	L	0.30	0.50	0.012	0.020
D1	2.90	3.20	0.114	0.126	L1	0.13 TYP.		0.005 TYP.	
D2	1.54	1.98	0.061	0.078	K	0.30	-	0.012	-
D3	0.13 TYP.		0.005 TYP.		θ	8°	13°	8°	13°
E	3.20	3.40	0.126	0.134	M	-	0.15	-	0.006
E1	2.90	3.20	0.114	0.126					

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