N- And P-Channel Enhancement Mode MOSFET

MTC3588BDFA6

	N-CH	P-CH
BV_{DSS}	14V	-14V
I_D	6A(V_{GS}=4.5V)	-4A(V_{GS}=-4.5 V)
$R_{DSON(TYP.)}$	16.6mΩ(V_{GS}=4.5V)	43mΩ(V_{GS}=-4.5V)
	23.7mΩ(V_{GS}=2.5V)	63.6mΩ(V_{GS}=-2.5V)
	38.5mΩ(V_{GS}=1.8V)	86.5mΩ(V_{GS}=-1.8V)
	66.3mΩ(V_{GS}=1.5V)	153.3mΩ(V_{GS}=-1.5V)

Description

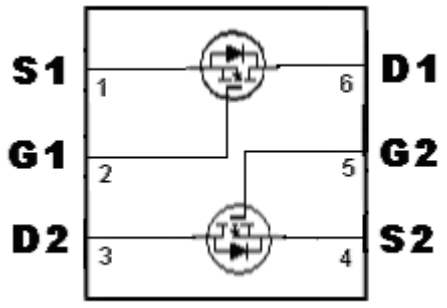
The MTC3588BDFA6 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single DFN2*2-6L package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The DFN2*2-6L package is universally preferred for all commercial-industrial surface mount applications.

Features

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

Equivalent Circuit

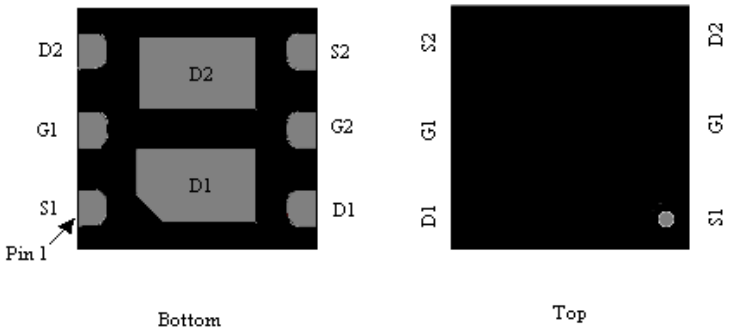
MTC3588BDFA6



G：Gate S：Source D：Drain

Outline

DFN2x2-6L



Ordering Information

Device	Package	Shipping
MTC3588BDFA6-0-T1-G	DFN2x2-6L (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, T1 : 3000 pcs / tape & reel, 7" 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}	14	-14	V
Gate-Source Voltage	V_{GS}	±8	±8	
Continuous Drain Current @T_A=25 °C (Note 1)	I_D	6.0	-4.0	A
Continuous Drain Current @T_A=70 °C (Note 1)		4.8	-3.2	
Pulsed Drain Current (Note 2)	I_{DM}	30	-20	
Total Power Dissipation (Note 1)	P_D	1.38		W
Linear Derating Factor		0.01		W / °C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150		°C

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec
2.Pulse width limited by maximum junction temperature

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	80	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	90 (Note)	

Note :.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec; 195°C/W when mounted on minimum copper pad

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	14	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	8	-	mV/°C	Reference to 25°C, I_D=1mA
$V_{GS(th)}$	0.5	0.7	1.2	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=12V, V_{GS}=0V
	-	-	10		V_{DS}=10V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	16.6	26	mΩ	V_{GS}=4.5V, I_D=5A
	-	23.7	33		V_{GS}=2.5V, I_D=4.6A
	-	38.5	74		V_{GS}=1.8V, I_D=4.1A
	-	66.3	114		V_{GS}=1.5V, I_D=2A
*G_{FS}	-	5.6	-	S	V_{DS}=5V, I_D=3A
Dynamic					
Ciss	-	407	-	pF	V_{DS}=10V, V_{GS}=0V, f=1MHz
Coss	-	115	-		
Crss	-	100	-		
*$t_{d(ON)}$	-	5	-	ns	V_{DS}=10V, I_D=1A, V_{GS}=5V, R_G=3.3Ω
*t_r	-	18.8	-		
*$t_{d(OFF)}$	-	49.6	-		
*t_f	-	30.8	-		

*Qg	-	6.5	-	nC	V_{DS}=10V, I_D=3A, V_{GS}=4.5V
*Qgs	-	0.7	-		
*Qgd	-	2.3	-		
Rg	-	1	-	Ω	f=1MHz
Source-Drain Diode					
*V_{SD}	-	0.87	1.2	V	V_{GS}=0V, I_S=5.2A
*trr	-	12	-	ns	I_F=3A, V_{GS}=0V, dI_F/dt=100A/μs
*Qrr	-	2.3	-	nC	

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

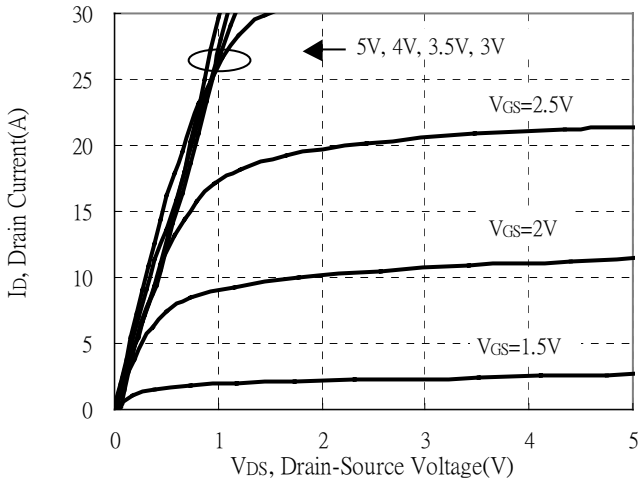
P-Channel Electrical Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-14	-	-	V	V_{GS}=0V, I_D=-250μA
$\Delta BV_{DSS}/\Delta Tj$	-	-5	-	mV/°C	Reference to 25°C, I_D=-250μA
$V_{GS(th)}$	-0.4	-	-1.0	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-12V, V_{GS}=0V
	-	-	-10		V_{DS}=-10V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	43	56	mΩ	V_{GS}=-4.5V, I_D=-3.6A
	-	63.6	79		V_{GS}=-2.5V, I_D=-3.2A
	-	86.5	168		V_{GS}=-1.8V, I_D=-1A
	-	153.3	276		V_{GS}=-1.5V, I_D=-1A
*G_{FS}	-	5.6	-	S	V_{DS}=-5V, I_D=-2A
Dynamic					
Ciss	-	561	-	pF	V_{DS}=-10V, V_{GS}=0V, f=1MHz
Coss	-	153	-		
Crss	-	142	-		
*$t_{d(ON)}$	-	5	-	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-5V, R_G=3.3Ω
*t_r	-	18.8	-		
*$t_{d(OFF)}$	-	49.6	-		
*t_f	-	30.8	-		
*Qg	-	8	-	nC	V_{DS}=-10V, I_D=-2A, V_{GS}=-4.5V
*Qgs	-	1	-		
*Qgd	-	2.8	-		
Rg	-	9.3	-	Ω	f=1MHz
Source-Drain Diode					
*V_{SD}	-	-0.9	-1.2	V	V_{GS}=0V, I_S=-3.4A
*trr	-	27	-	ns	I_F=-2A, V_{GS}=0V, dI_F/dt=100A/μs
*Qrr	-	7	-	nC	

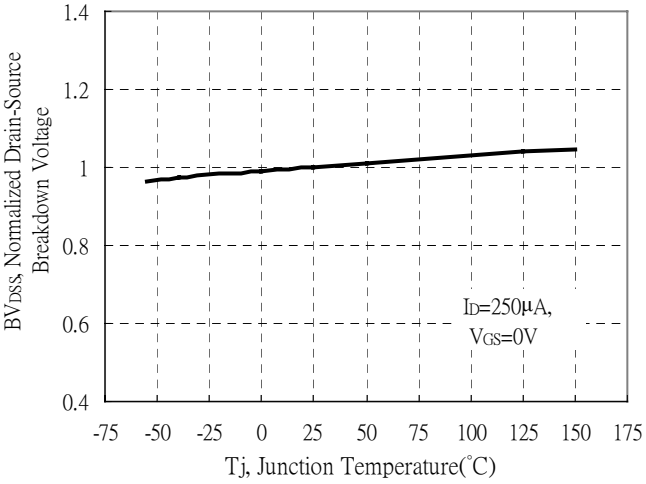
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

N-channel Typical Characteristics

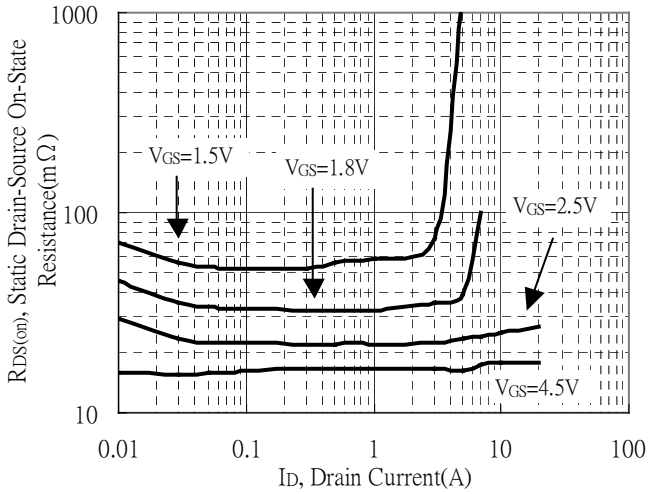
Typical Output Characteristics



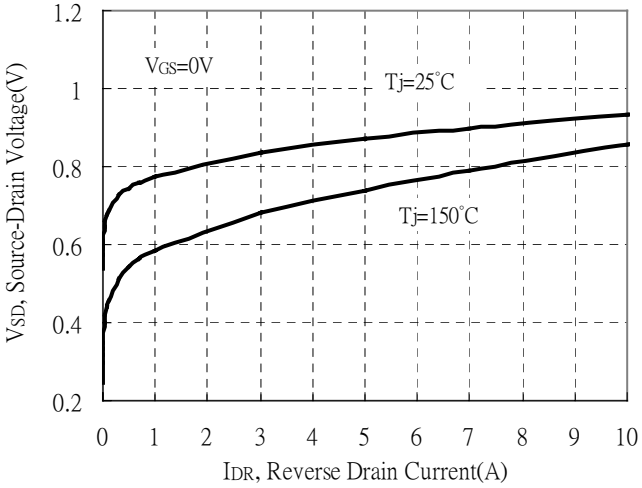
Brekdown Voltage vs Ambient Temperature



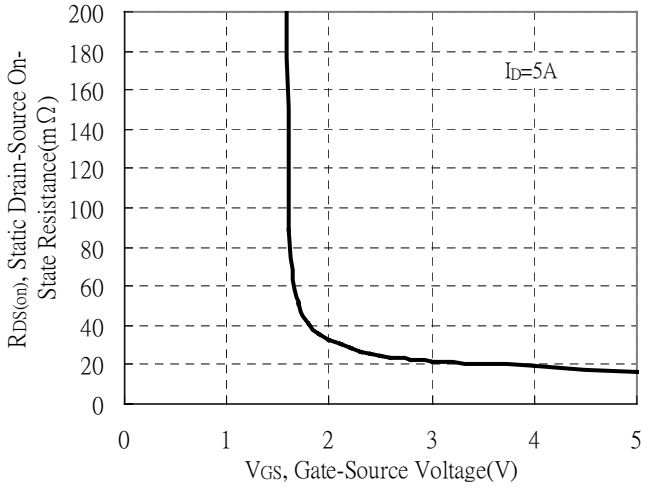
Static Drain-Source On-State resistance vs Drain Current



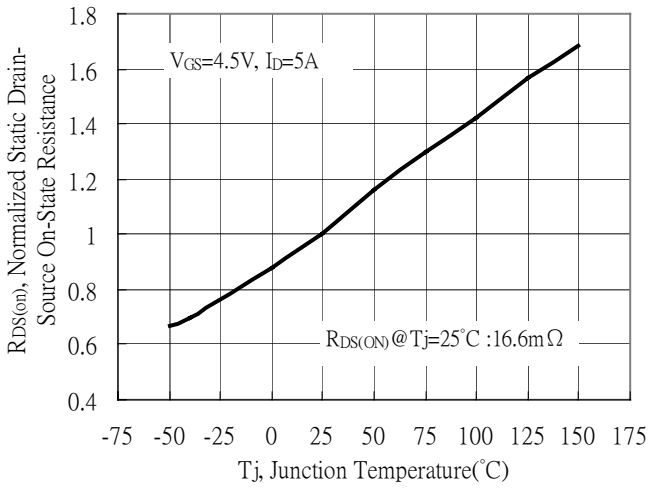
Reverse Drain Current vs Source-Drain Voltage



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

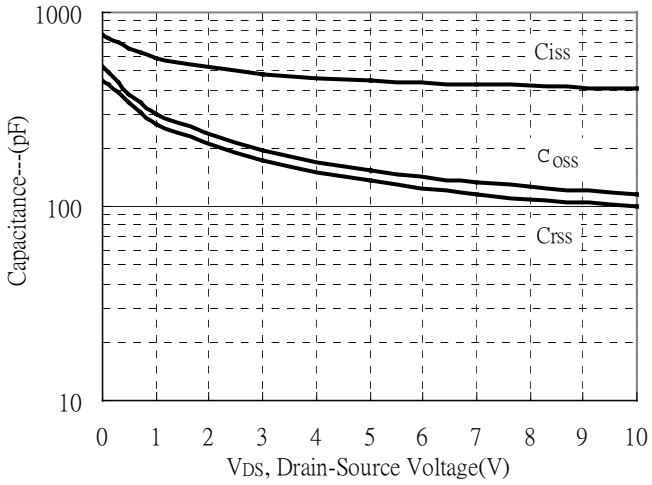


Drain-Source On-State Resistance vs Junction Tempearture

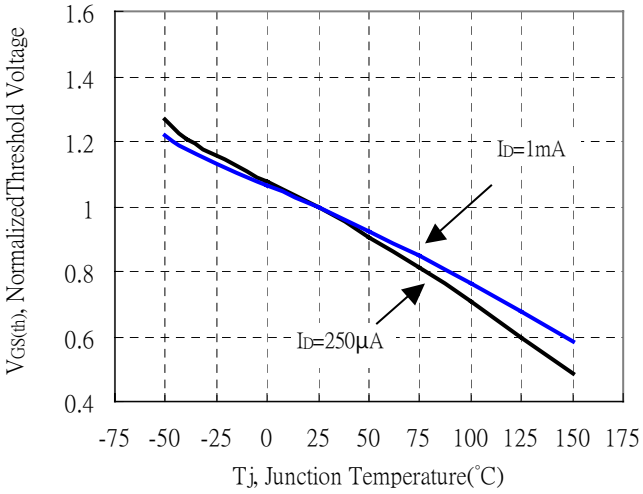


N-channel Typical Characteristics(Cont.)

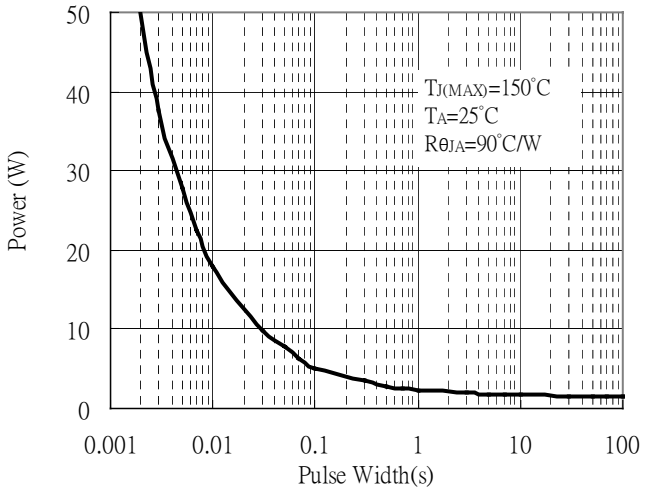
Capacitance vs Drain-to-Source Voltage



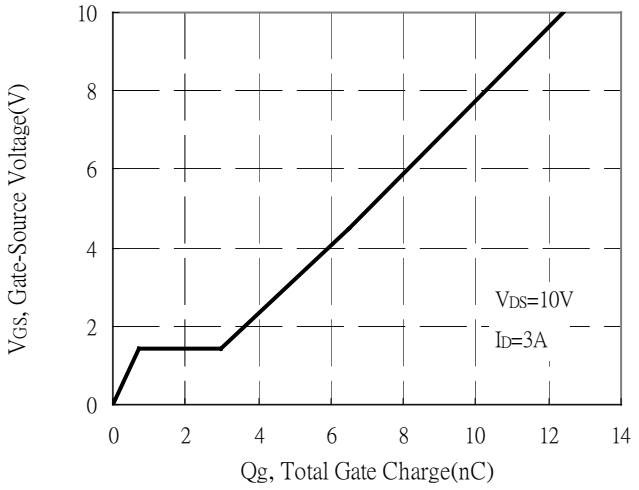
Threshold Voltage vs Junction Tempearture



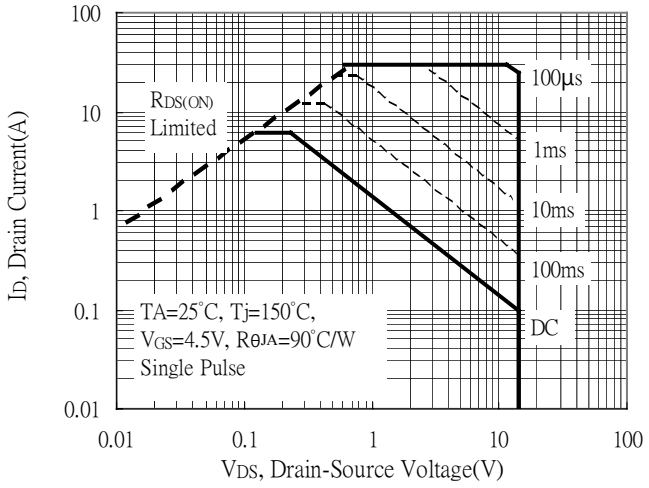
Single Pulse Power Rating, Junction to Ambient



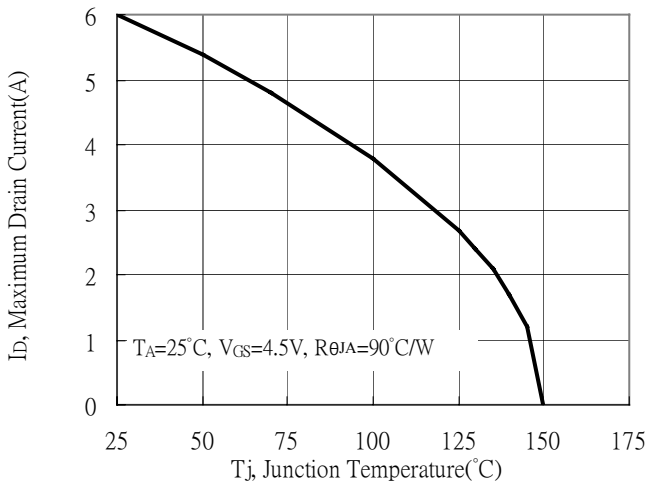
Gate Charge Characteristics



Maximum Safe Operating Area

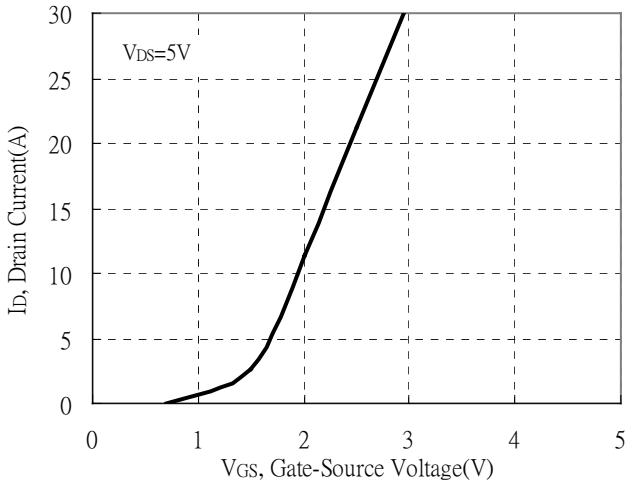


Maximum Drain Current vs JunctionTemperature

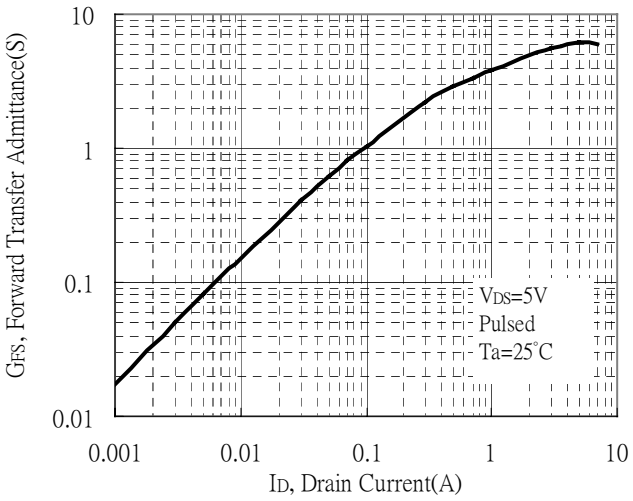


N-channel Typical Characteristics(Cont.)

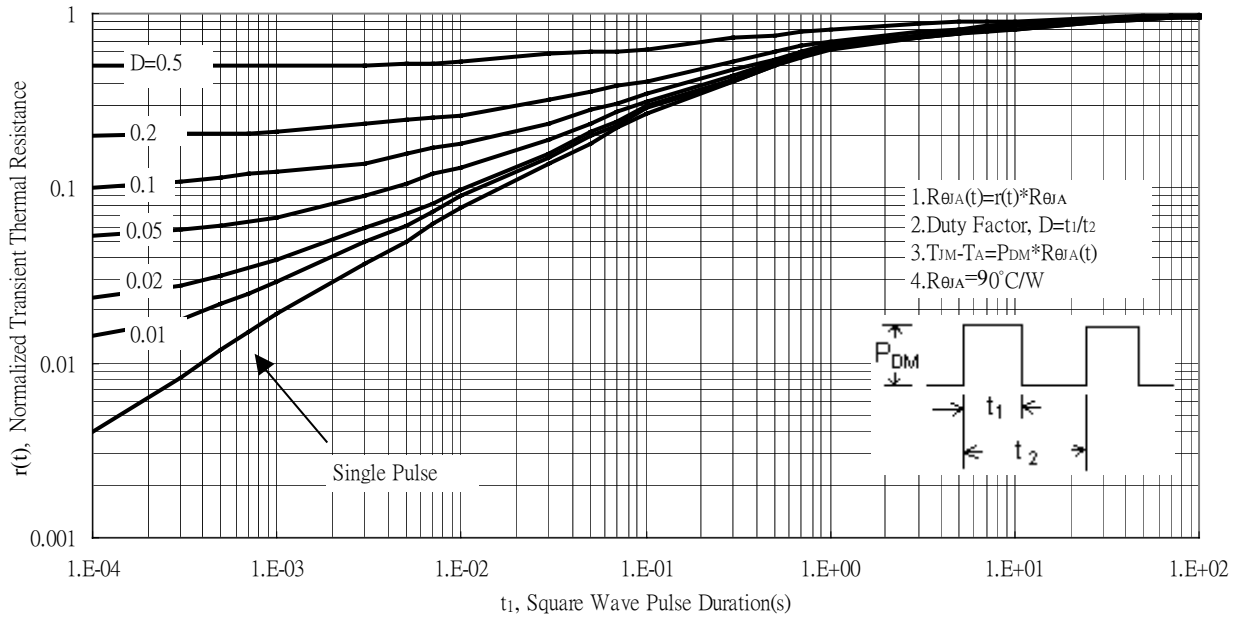
Typical Transfer Characteristics



Forward Transfer Admittance vs Drain Current

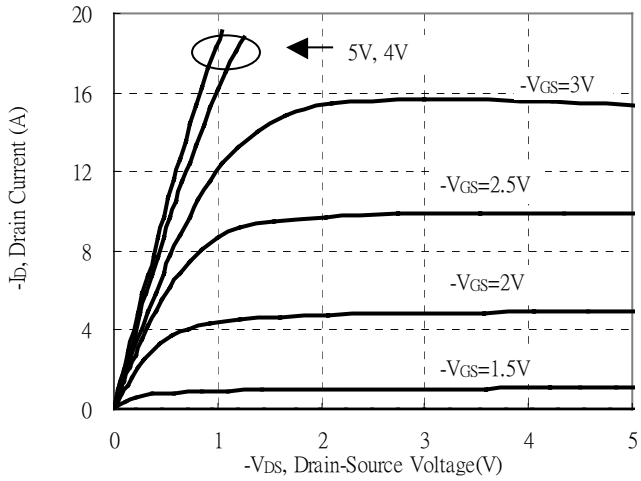


Transient Thermal Response Curves

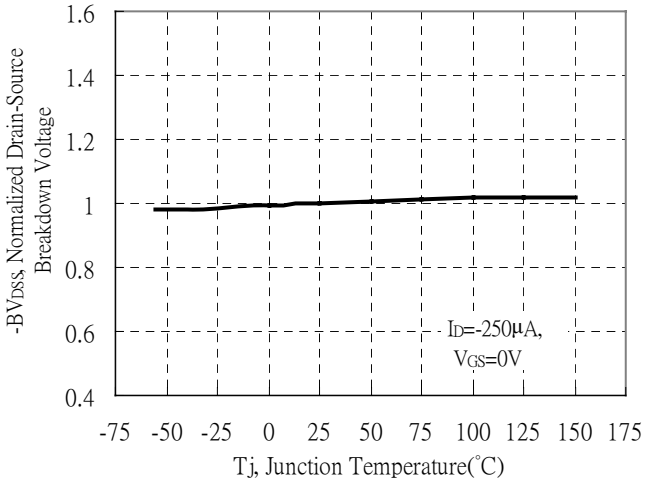


P-channel Typical Characteristics

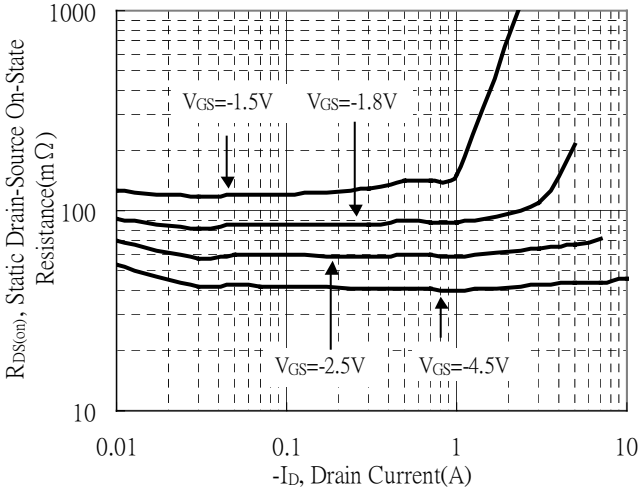
Typical Output Characteristics



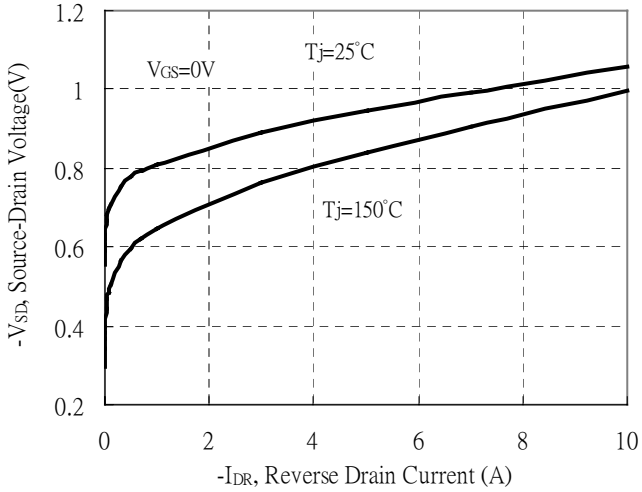
Brekdown Voltage vs Ambient Temperature



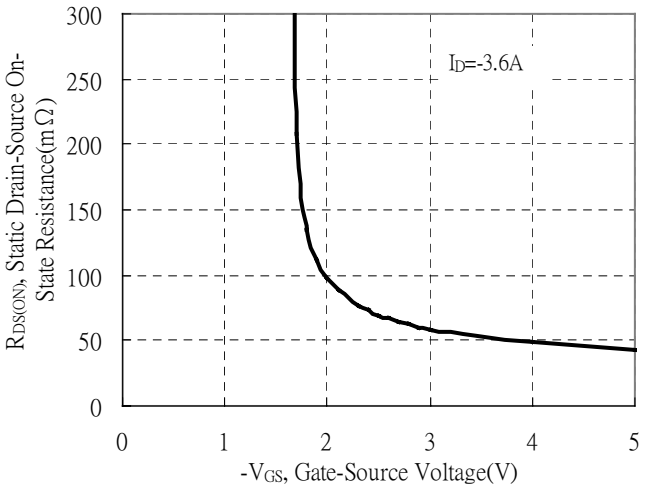
Static Drain-Source On-State resistance vs Drain Current



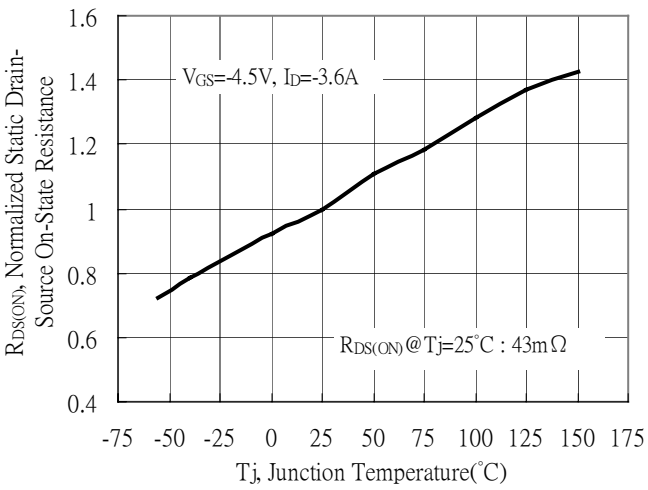
Reverse Drain Current vs Source-Drain Voltage



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

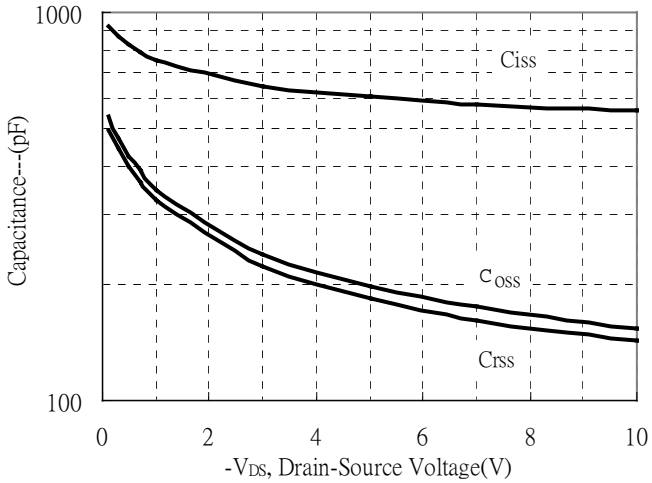


Drain-Source On-State Resistance vs Junction Tempearture

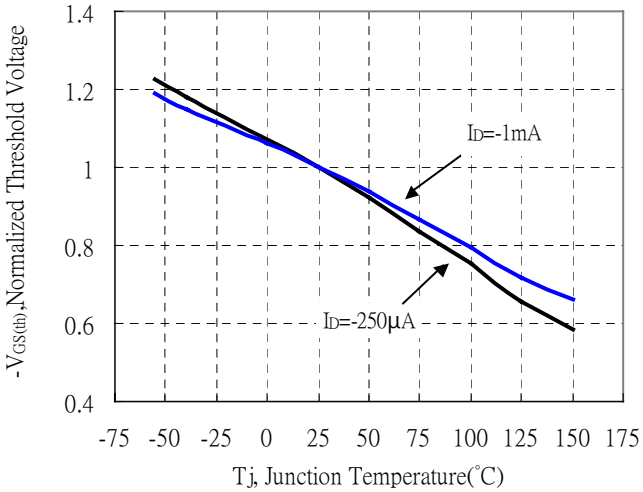


P-channel Typical Characteristics(Cont.)

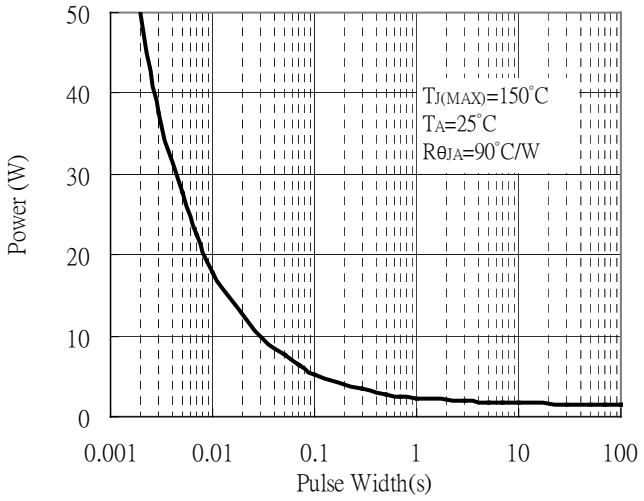
Capacitance vs Drain-to-Source Voltage



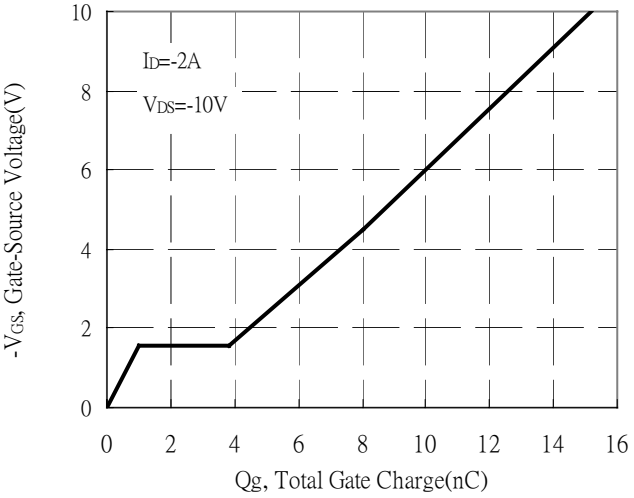
Threshold Voltage vs Junction Tempearture



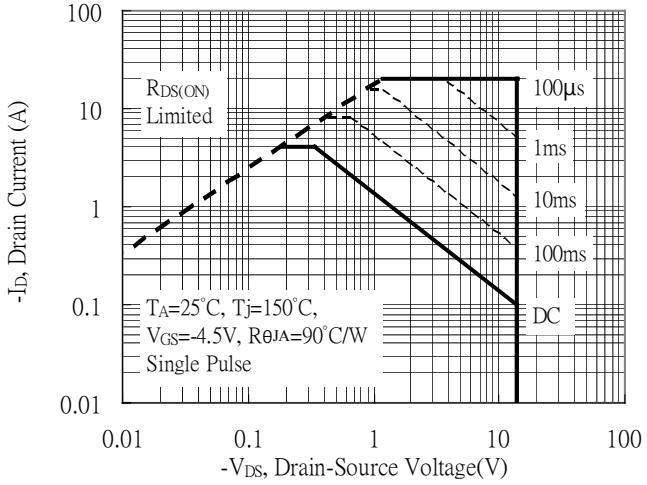
Single Pulse Power Rating, Junction to Ambient



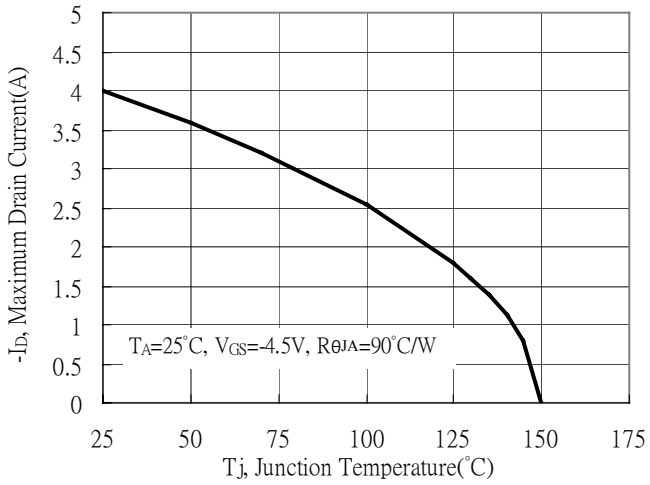
Gate Charge Characteristics



Maximum Safe Operating Area

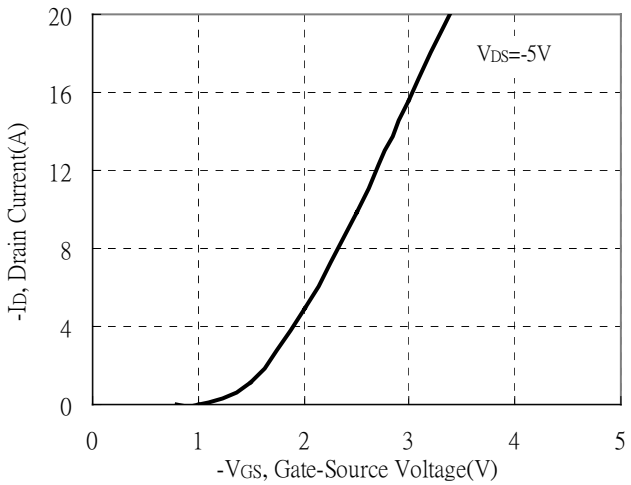


Maximum Drain Current vs JunctionTemperature

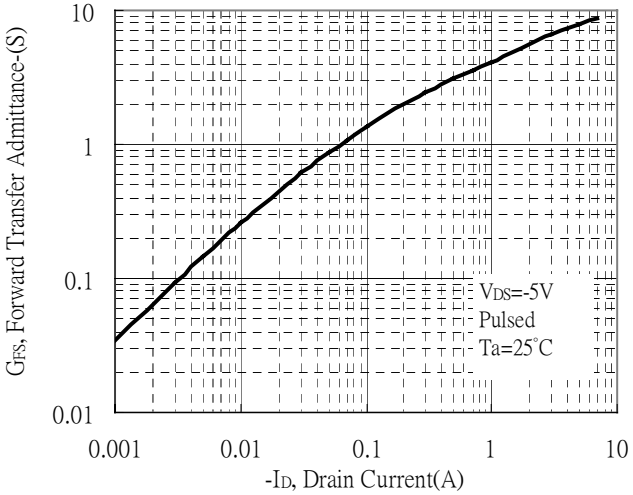


P-channel Typical Characteristics(Cont.)

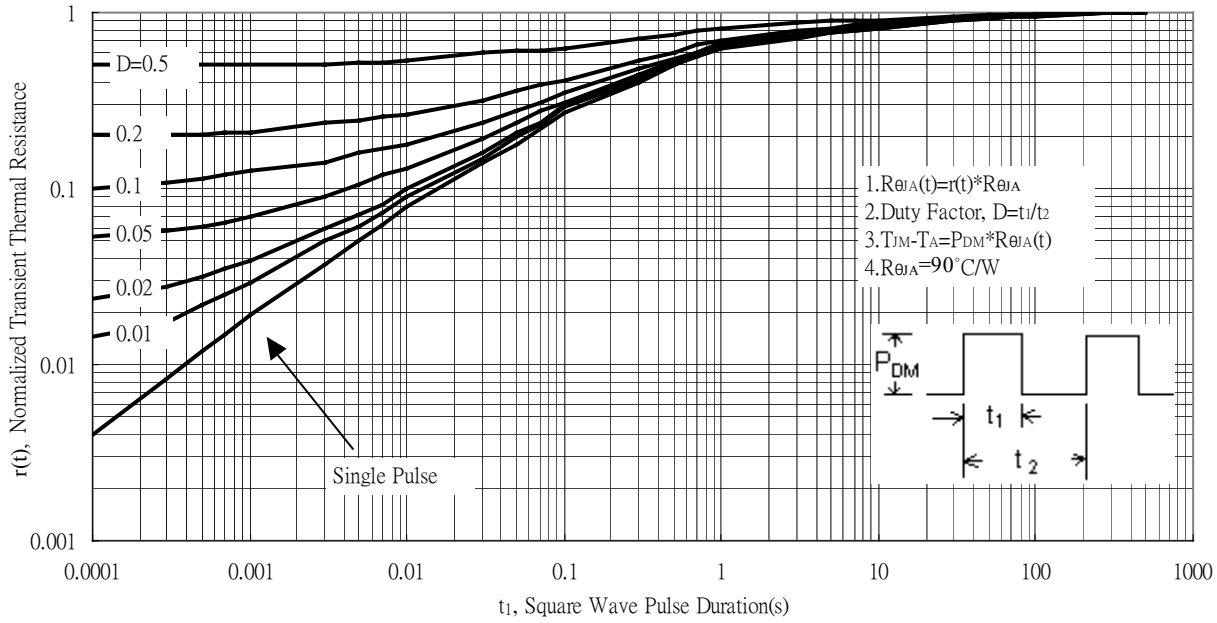
Typical Transfer Characteristics



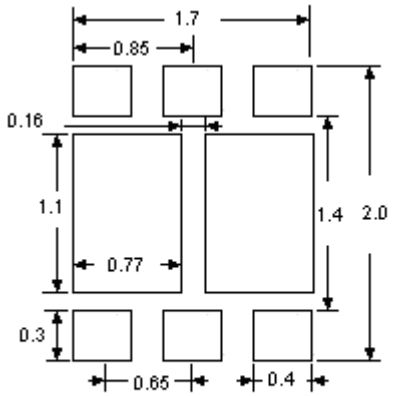
Forward Transfer Admittance vs Drain Current



Transient Thermal Response Curves

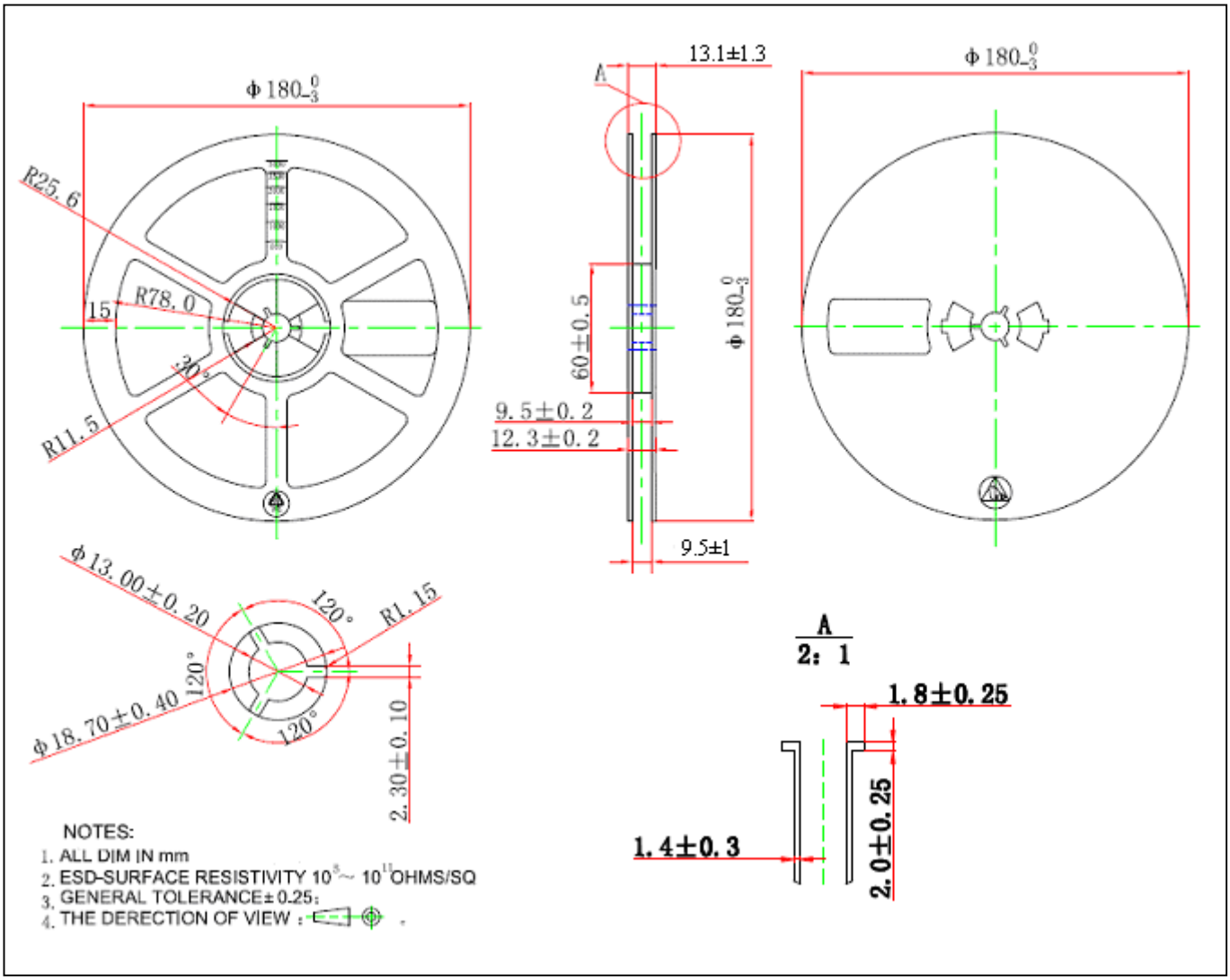


Recommended Soldering Footprint

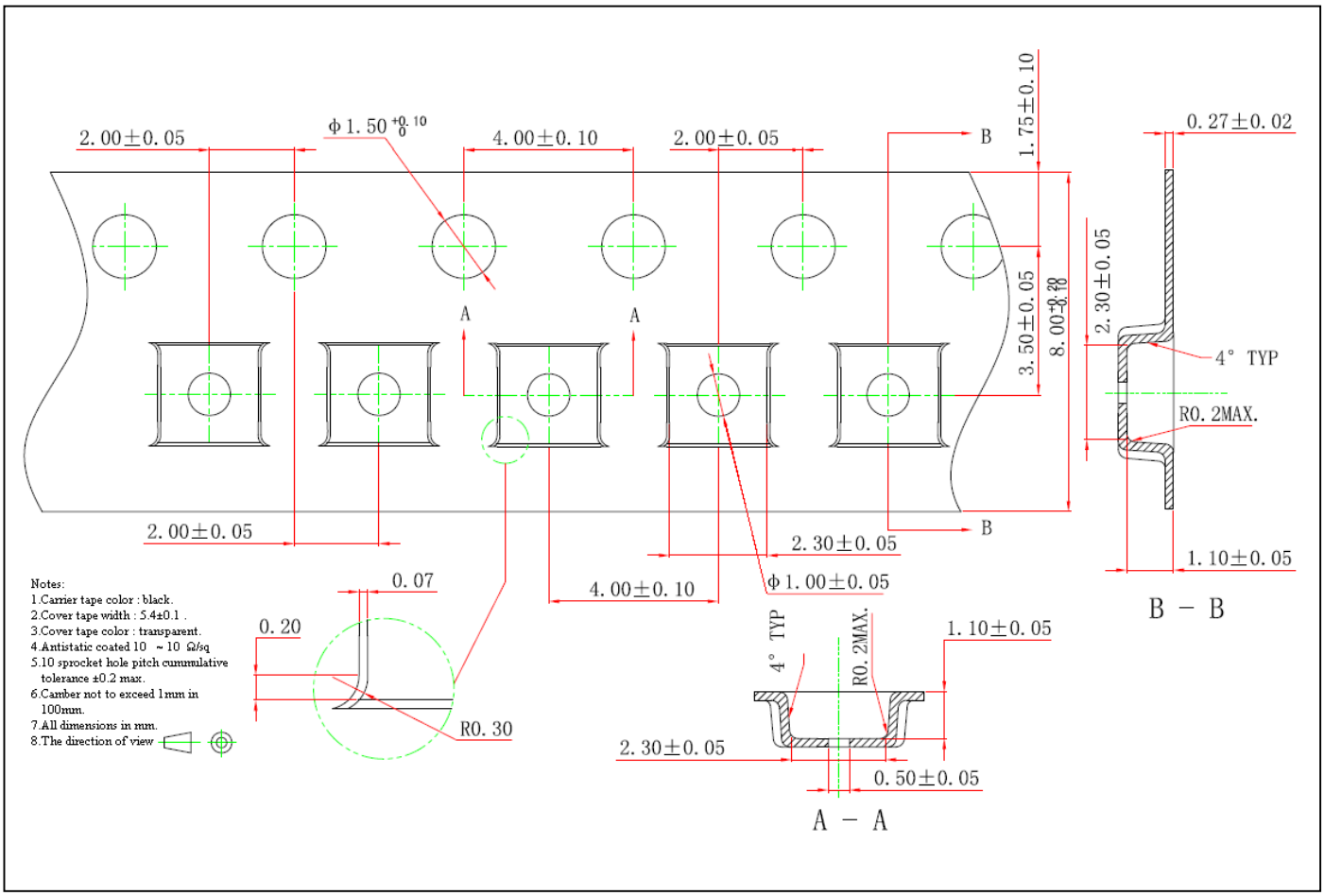


Unit : mm

Reel Dimension



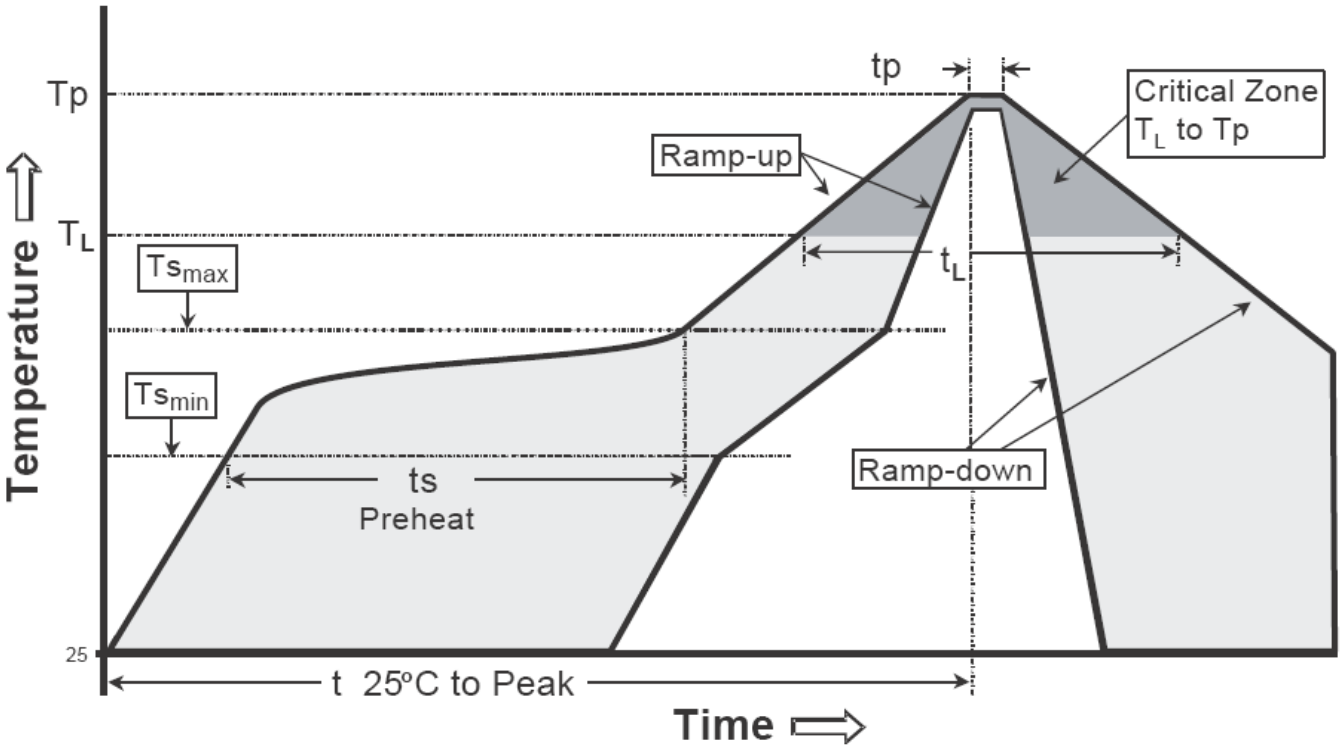
Carrier Tape Dimension



Recommended wave soldering condition

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

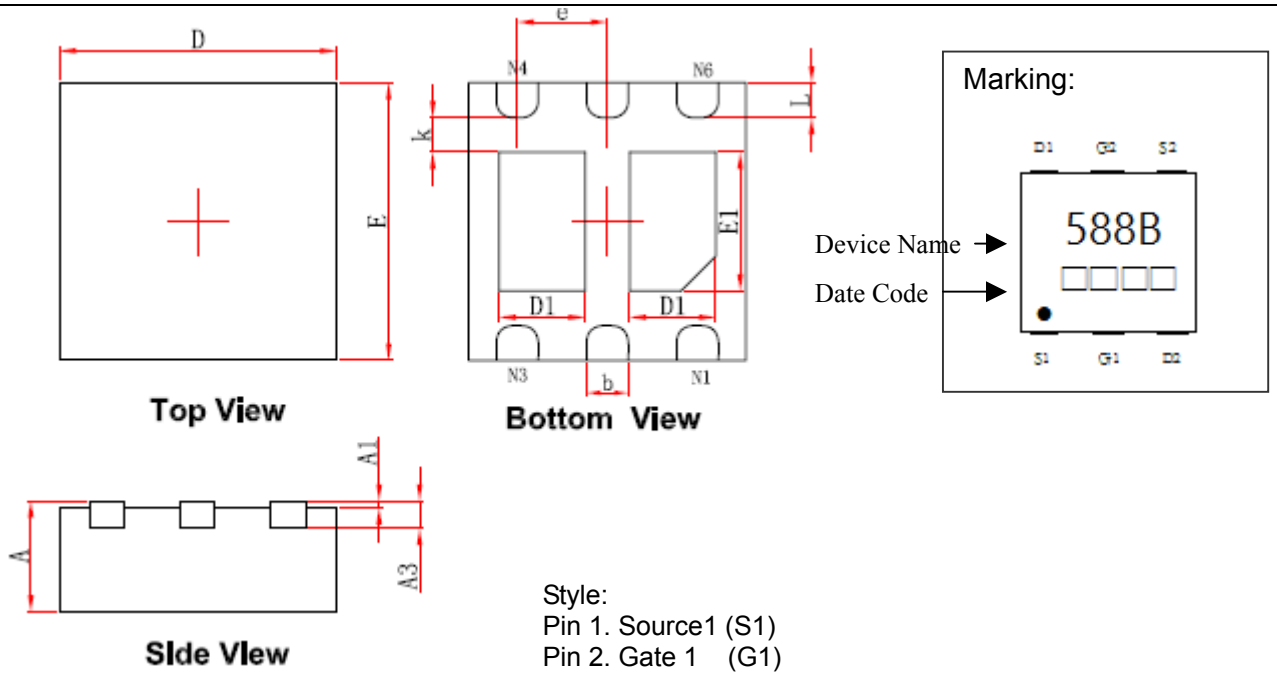
Recommended temperature profile for IR reflow



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.

DFN2x2-6L Dimension



Style:
Pin 1. Source1 (S1)
Pin 2. Gate 1 (G1)
Pin 3. Drain2 (D2)
Pin 4. Source2 (S2)
Pin 5. Gate2 (G2)
Pin 6. Drain1 (D1)

6-Lead DFN2x2-6L Plastic
Surface Mounted Package
CYStek Package Code: DFA6

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035	E1	0.900	1.100	0.035	0.043
A1	0.000	0.050	0.000	0.002	k	0.200	-	0.008	-
A3	0.203 REF		0.008 REF		b	0.250	0.350	0.010	0.014
D	1.950	2.050	0.077	0.081	e	0.650 TYP		0.026 TYP	
E	1.950	2.050	0.077	0.081	L	0.200	0.300	0.008	0.012
D1	0.570	0.770	0.022	0.030					

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.