N- AND P-Channel Enhancement Mode Power MOSFET

MTC3586BDFA6

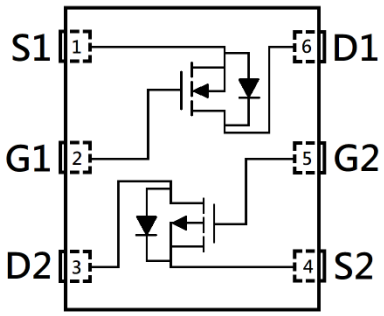
Features

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

	N-CH	P-CH
BV_{DSS}	20V	-20V
I_D@V_{GS}=(-)4.5V, T_C=25°C	8A	-5.6A
I_D@V_{GS}=(-)4.5V, T_A=25°C	4.6A	-3.2A
$R_{DS(ON)typ.}$ @V_{GS}=(-)4.5V	24mΩ	60mΩ
$R_{DS(ON)typ.}$ @V_{GS}=(-)2.5V	28mΩ	80mΩ
$R_{DS(ON)typ.}$ @V_{GS}=(-)1.5V	55mΩ	160mΩ

Equivalent Circuit

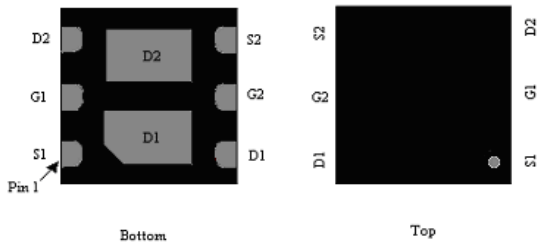
MTC3586BDFA6



G : Gate S : Source D : Drain

Outline

DFN2×2-6L



Ordering Information

Device	Package	Shipping
MTC3586BDFA6-0-T1-G	DFN2×2-6L (RoHS compliant & 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 (T_A=25°C)

Parameter		Symbol	Limits		Unit
			N-CH	P-CH	
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±8	±8	
Continuous Drain Current @ V_{GS}=(-)4.5V, T_C=25°C	*a	I_D	8	-5.6	A
Continuous Drain Current @ V_{GS}=(-)4.5V, T_C=100°C	*a		5.1	-3.5	
Continuous Drain Current @ V_{GS}=(-)4.5V, T_A=25°C	*b		4.6	-3.2	
Continuous Drain Current @ V_{GS}=(-)4.5V, T_A=70°C	*b		3.7	-2.6	
Pulsed Drain Current	*c	I_{DM}	32	-22	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	3.3	-3.3	
Avalanche Current @ L=0.1mH		I_{AS}	8	-8	
Avalanche Energy @ L=0.5mH		E_{AS}	6	6	mJ
Total Power Dissipation	T_C=25°C *a	P_D	4		W
	T_C=100°C *a		1.6		
	T_A=25°C *b		1.3		
	T_A=70°C *b		0.8		
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150		°C

Thermal Data

Parameter		Symbol	Steady State	Unit
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	31	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	95	

Note:

*a. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

*b. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_D 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.

*c. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	0.3	-	1		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	7	-	S	V_{DS}=5V, I_D=3A
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=16V, V_{GS}=0V
$R_{DS(ON)}$	-	24	34	mΩ	V_{GS}=4.5V, I_D=3A
	-	28	42		V_{GS}=2.5V, I_D=1A
	-	55	140		V_{GS}=1.5V, I_D=0.5A
Dynamic					
Ciss	-	450	-	pF	V_{DS}=10V, V_{GS}=0V, f=1MHz
Coss	-	65	-		
Crss	-	60	-		
Rg	-	1	-	Ω	f=1MHz
Qg *1, 2	-	6.7	-	nC	V_{DS}=10V, I_D=3A, V_{GS}=4.5V
Qgs *1, 2	-	0.7	-		
Qgd *1, 2	-	1.5	-		
$t_{d(ON)}$ *1, 2	-	4	-	ns	V_{DS}=10V, I_D=1A, V_{GS}=5V, R_{GS}=3.3Ω
tr *1, 2	-	15.5	-		
$t_{d(OFF)}$ *1, 2	-	28	-		
t_f *1, 2	-	5	-		
Source-Drain Diode					
V_{SD} *1	-	0.85	1.2	V	I_S=3A, V_{GS}=0V
trr	-	5.5	-	ns	I_F=3A, dI_F/dt=100A/μs
Qrr	-	2	-	nC	

Note:

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

*2. Independent of operating temperature

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-0.3	-	-1		V_{DS}=V_{GS}, I_D=-250μA
G_{FS}	-	6	-	S	V_{DS}=-5V, I_D=-2A
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-16V, V_{GS}=0V
$R_{DS(ON)}$	-	60	84	mΩ	V_{GS}=-4.5V, I_D=-2.5A
	-	80	120		V_{GS}=-2.5V, I_D=-2A
	-	160	400		V_{GS}=-1.5V, I_D=-0.5A
Dynamic					
Ciss	-	660	-	pF	V_{DS}=-10V, V_{GS}=0V, f=1MHz
Coss	-	60	-		
Crss	-	58	-		
Rg	-	13.7	-	Ω	f=1MHz
Qg *1, 2	-	7.8	-	nC	V_{DS}=-10V, I_D=-2A, V_{GS}=-4.5V
Qgs *1, 2	-	1	-		
Qgd *1, 2	-	1.6	-		
$t_{d(ON)}$ *1, 2	-	5	-	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-5V, R_{GS}=3.3Ω
tr *1, 2	-	17	-		
$t_{d(OFF)}$ *1, 2	-	48	-		
t_f *1, 2	-	6	-		
Source-Drain Diode					
V_{SD} *1	-	-0.85	-1.2	V	I_S=-2A, V_{GS}=0V
trr	-	6.2	-	ns	I_F=-2A, dI_F/dt=100A/μs
Qrr	-	2.3	-	nC	

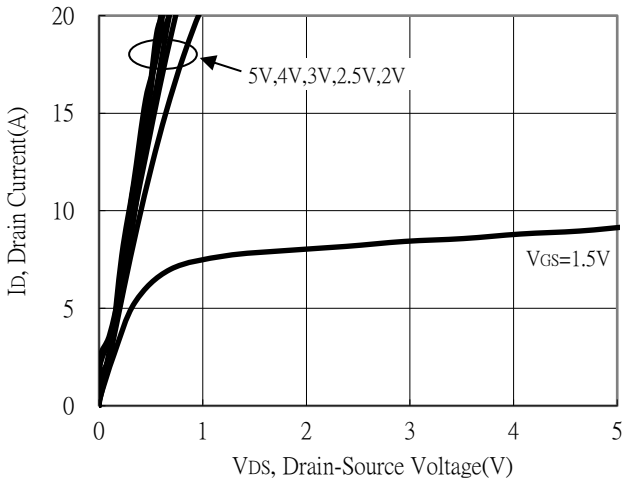
Note:

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

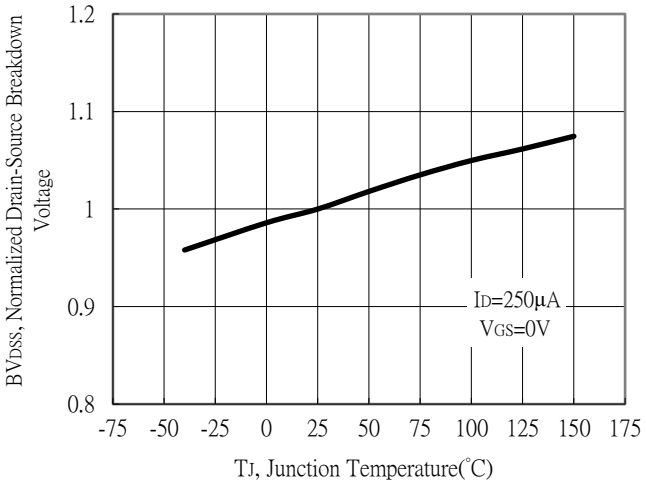
*2. Independent of operating temperature

Typical Characteristics : Q1(N-channel)

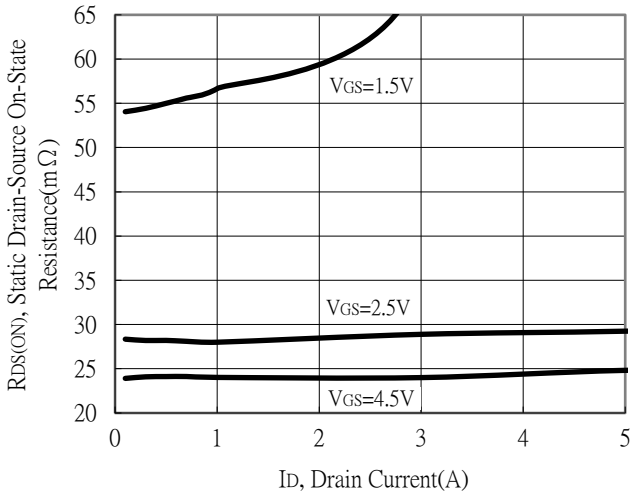
Typical Output Characteristics



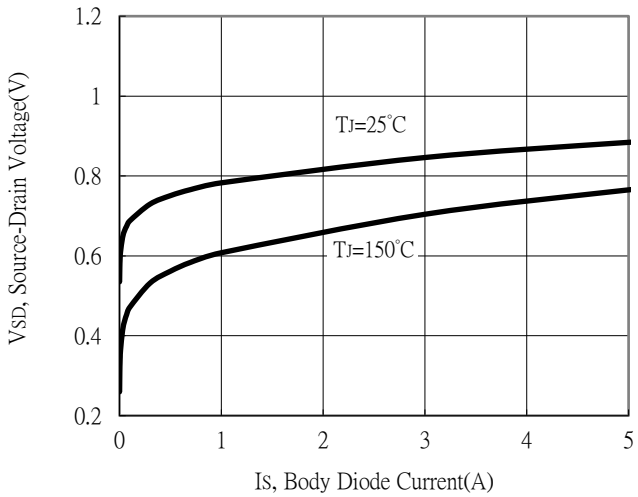
Breakdown Voltage vs Ambient Temperature



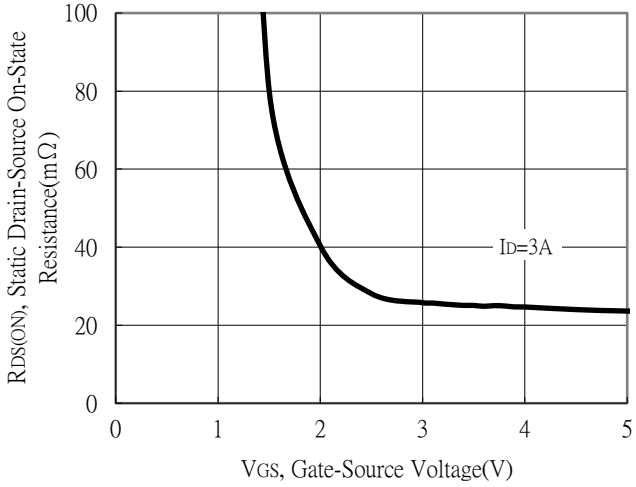
Static Drain-Source On-State resistance vs Drain Current



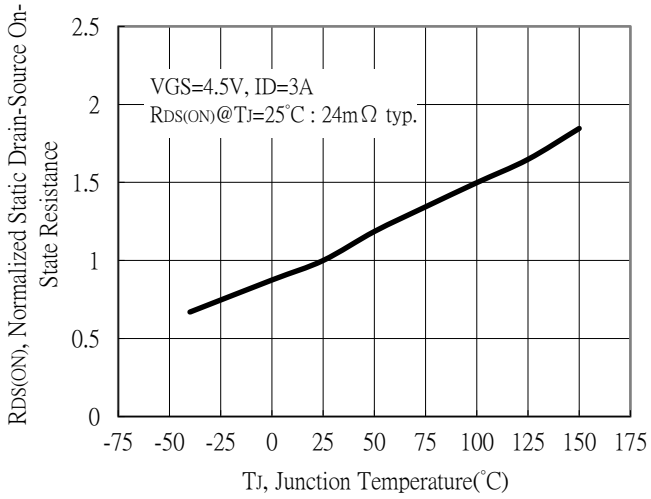
Body Diode Current vs Source-Drain Voltage



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

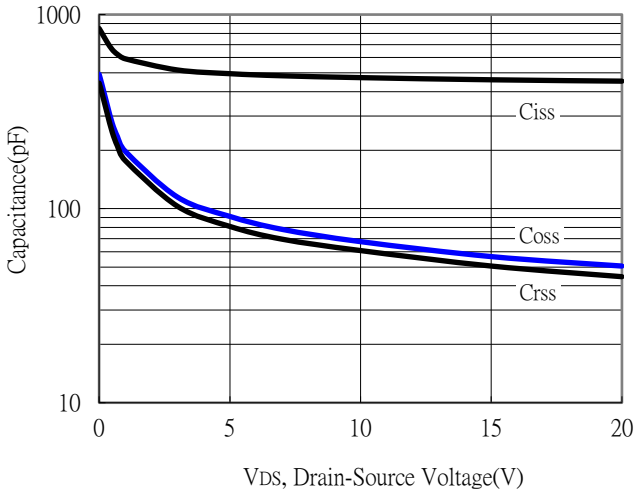


Drain-Source On-State Resistance vs Junction Temperature

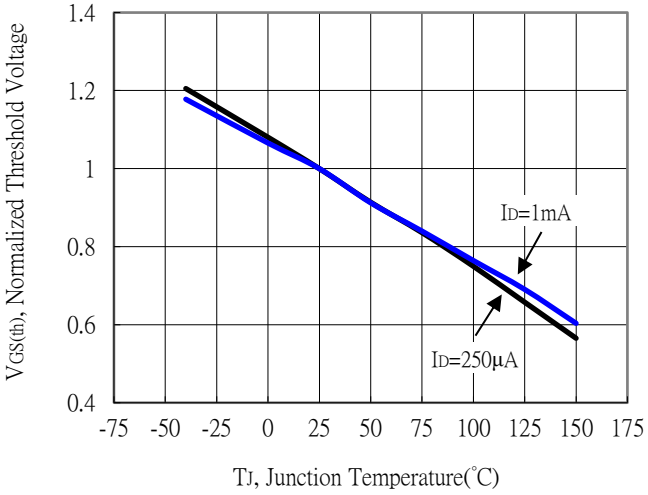


Typical Characteristics (Cont.) : Q1(N-channel)

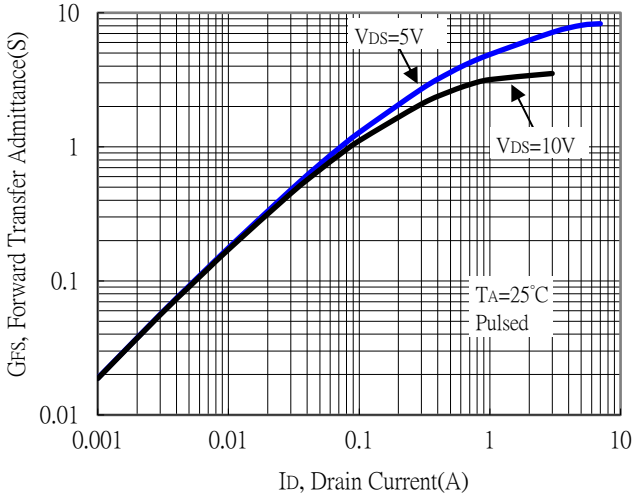
Capacitance vs Drain-to-Source Voltage



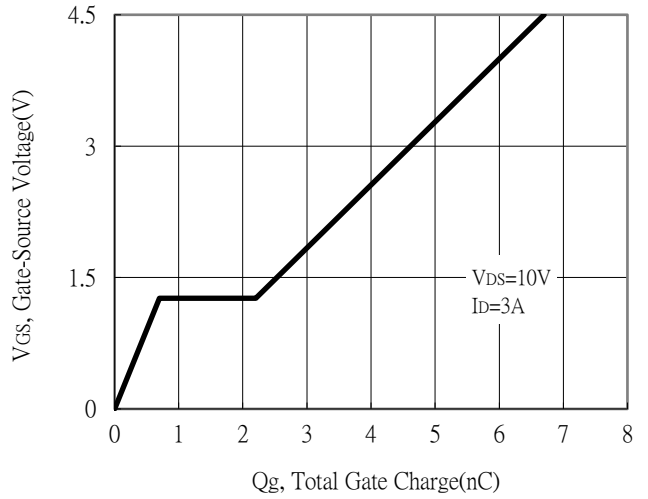
Threshold Voltage vs Junction Temperature



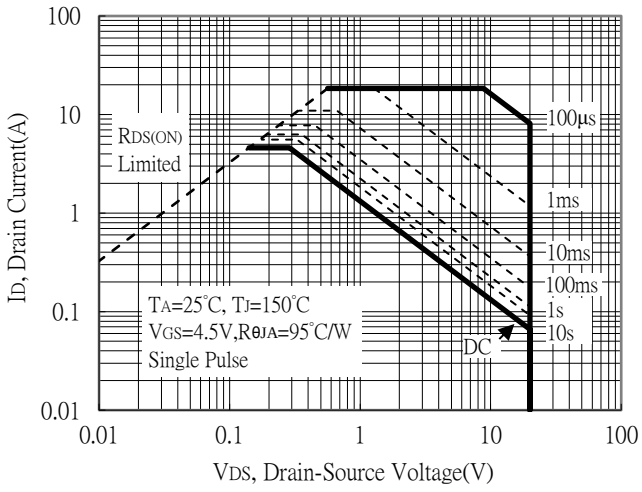
Forward Transfer Admittance vs Drain Current



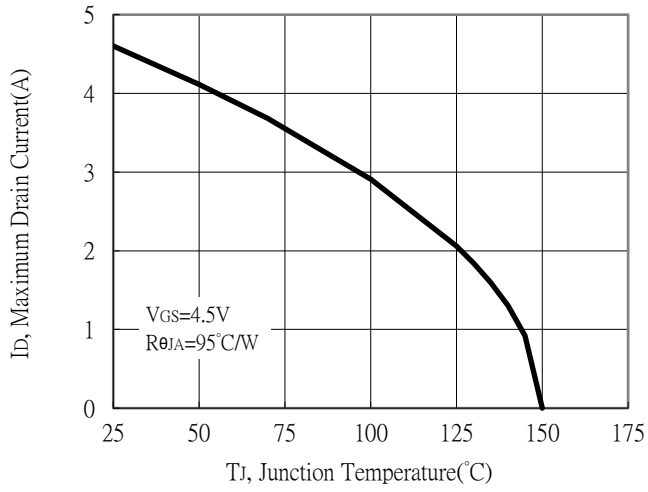
Gate Charge Characteristics



Maximum Safe Operating Area

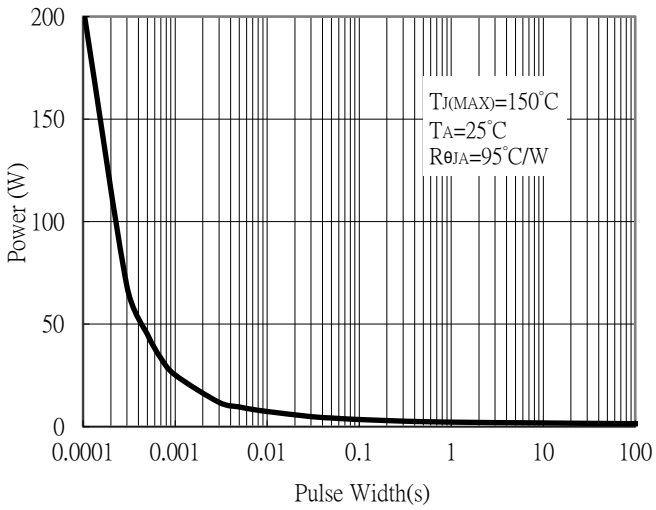


Maximum Drain Current vs Junction Temperature

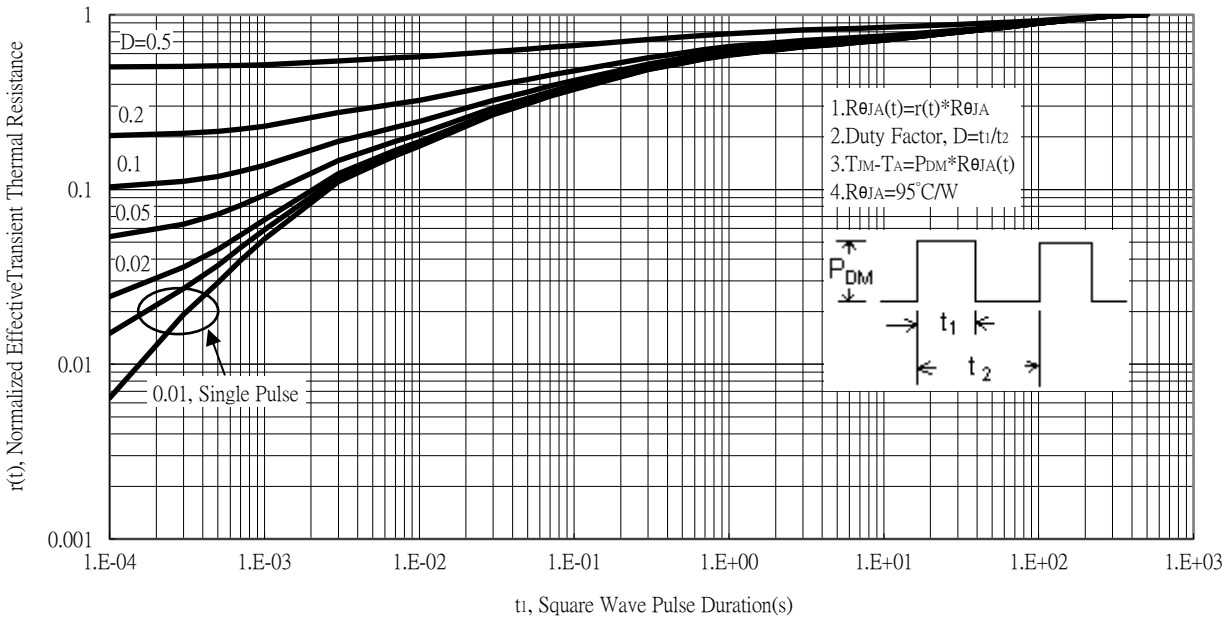


Typical Characteristics (Cont.) : Q1(N-channel)

Single Pulse Power Rating, Junction to Ambient

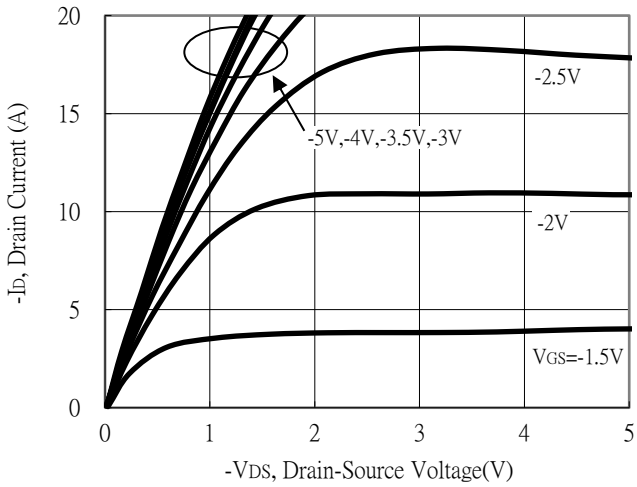


Transient Thermal Response Curves

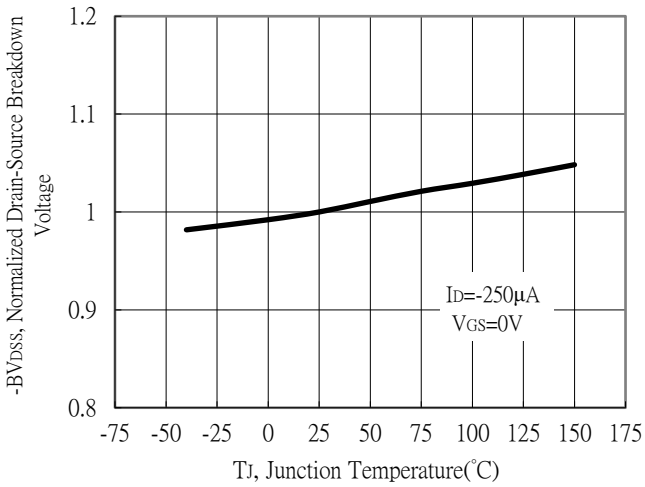


Typical Characteristics : Q2(P-channel)

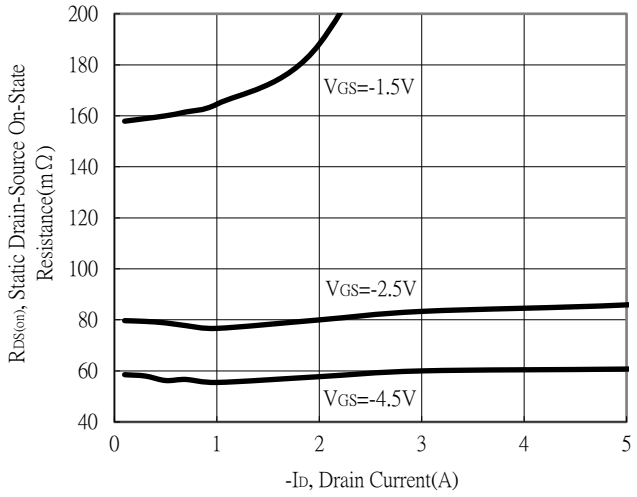
Typical Output Characteristics



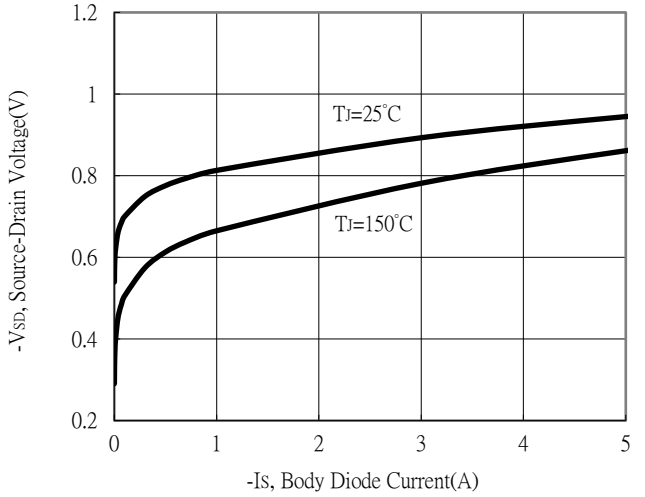
Breakdown Voltage vs Ambient Temperature



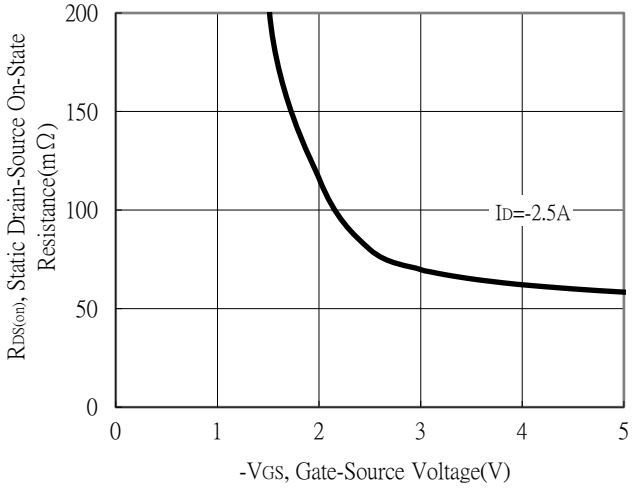
Static Drain-Source On-State resistance vs Drain Current



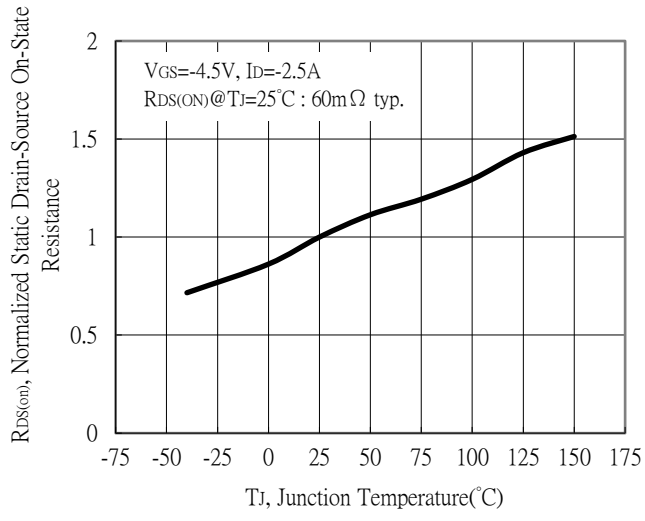
Body Diode Current vs Source-Drain Voltage



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

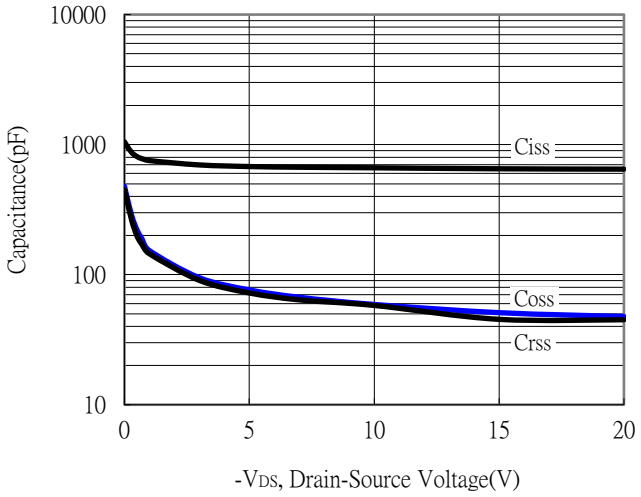


Drain-Source On-State Resistance vs Junction Temperature

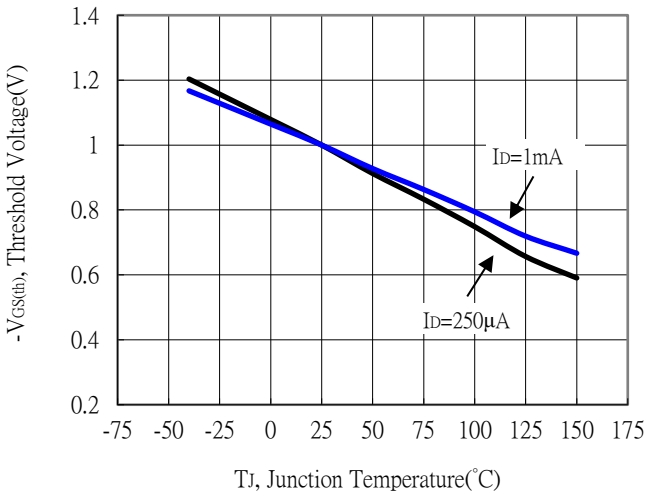


Typical Characteristics (Cont.) : Q2(P-channel)

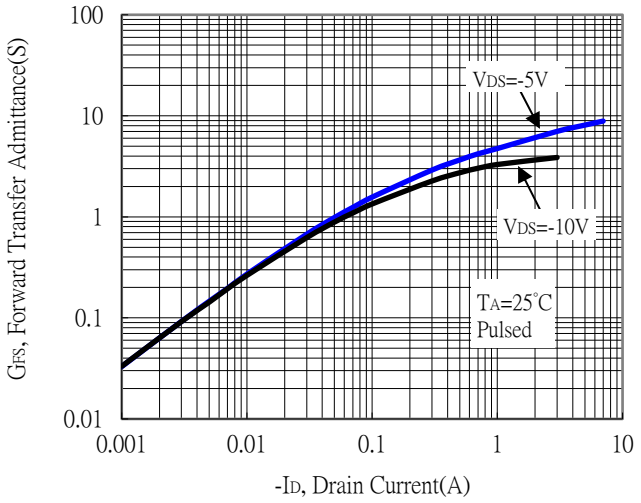
Capacitance vs Drain-to-Source Voltage



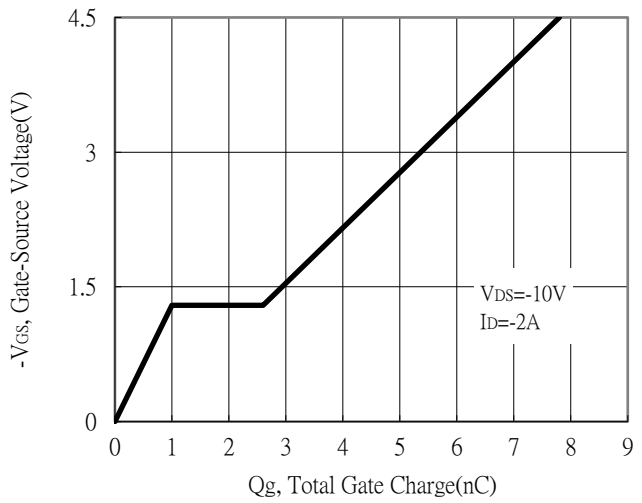
Threshold Voltage vs Junction Temperature



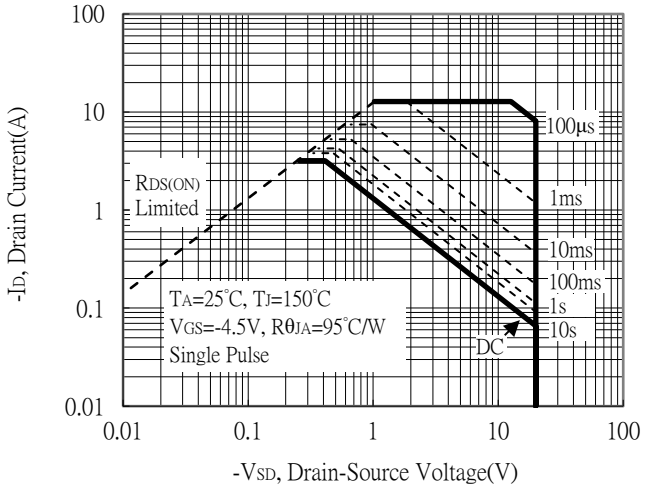
Forward Transfer Admittance vs Drain Current



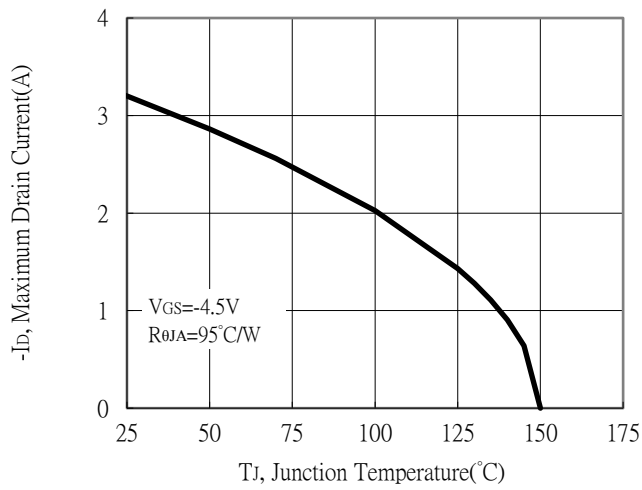
Gate Charge Characteristics



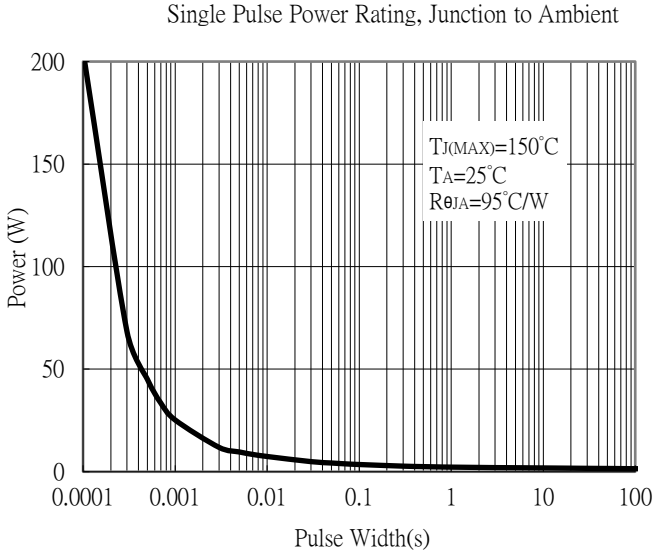
Maximum Safe Operating Area

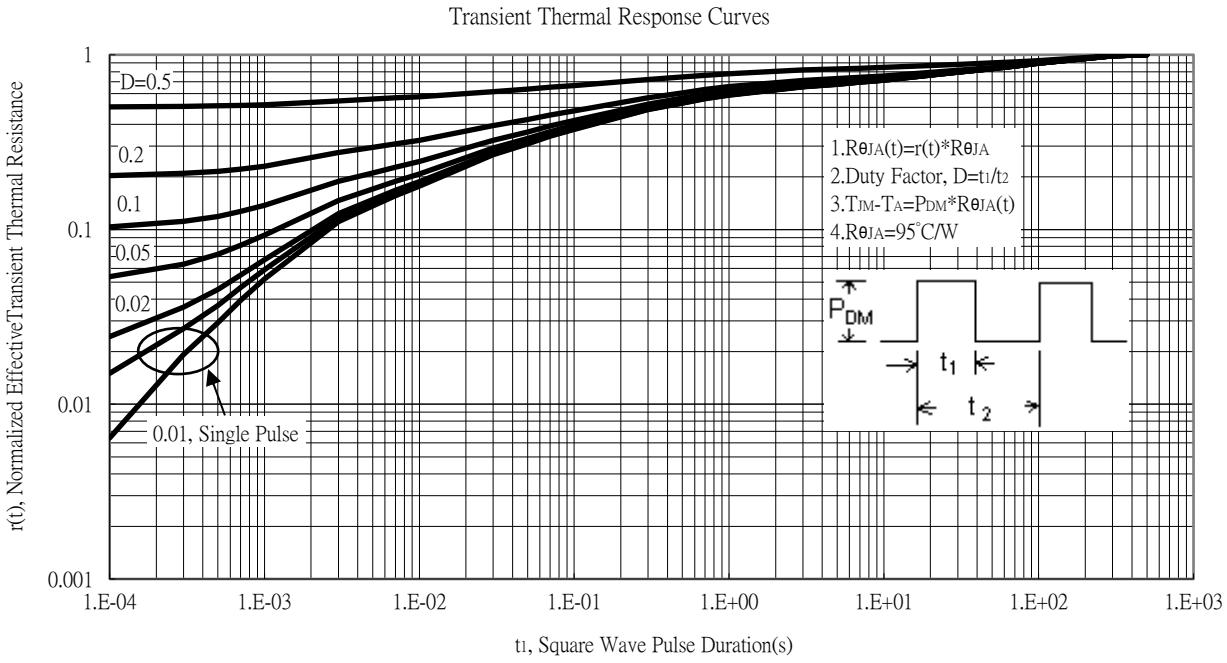


Maximum Drain Current vs Junction Temperature

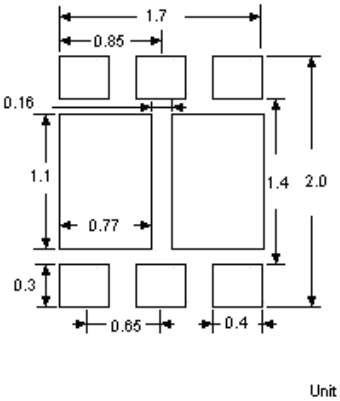


Typical Characteristics (Cont.) : Q2(P-channel)



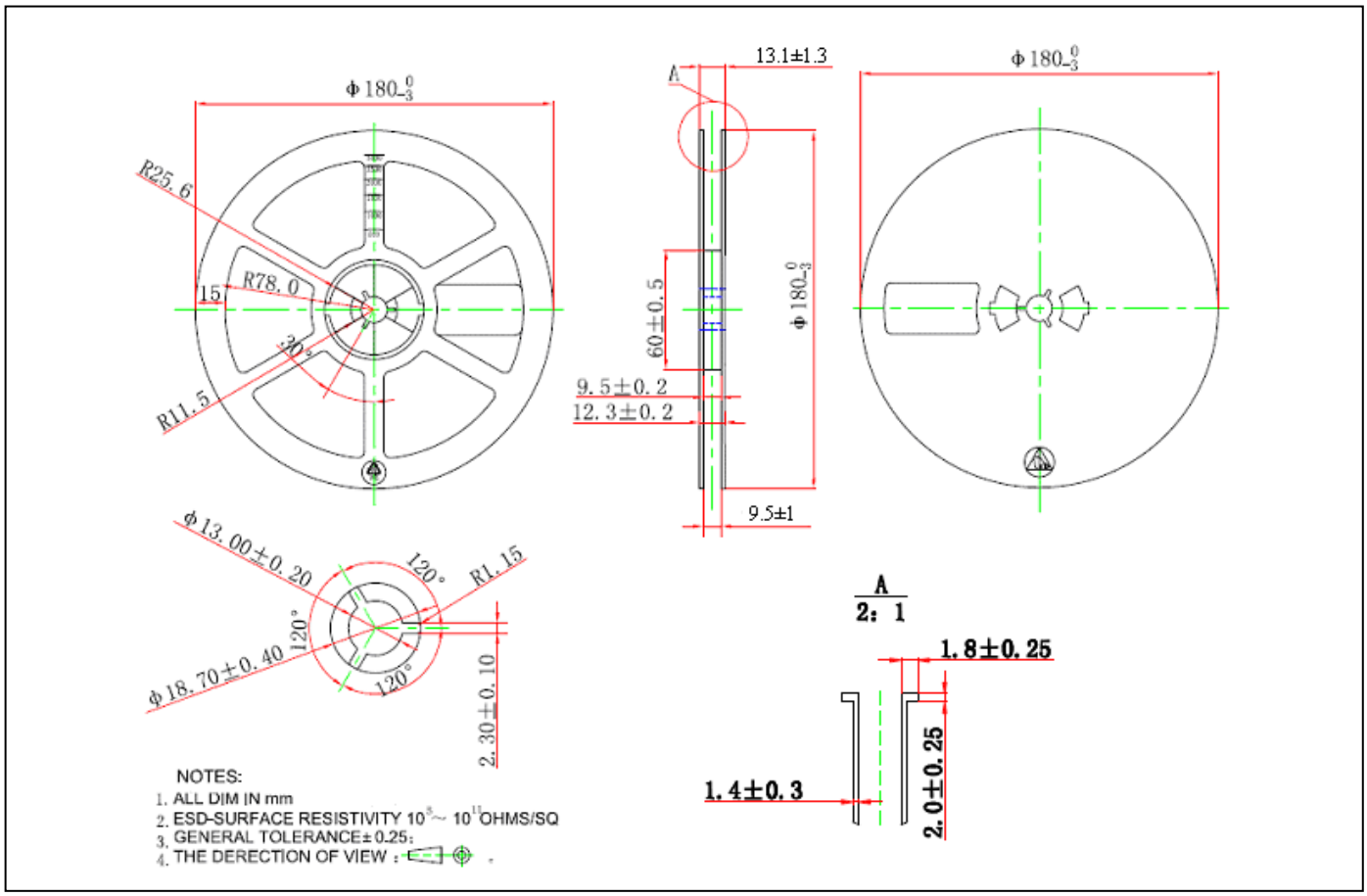


Recommended Soldering Footprint

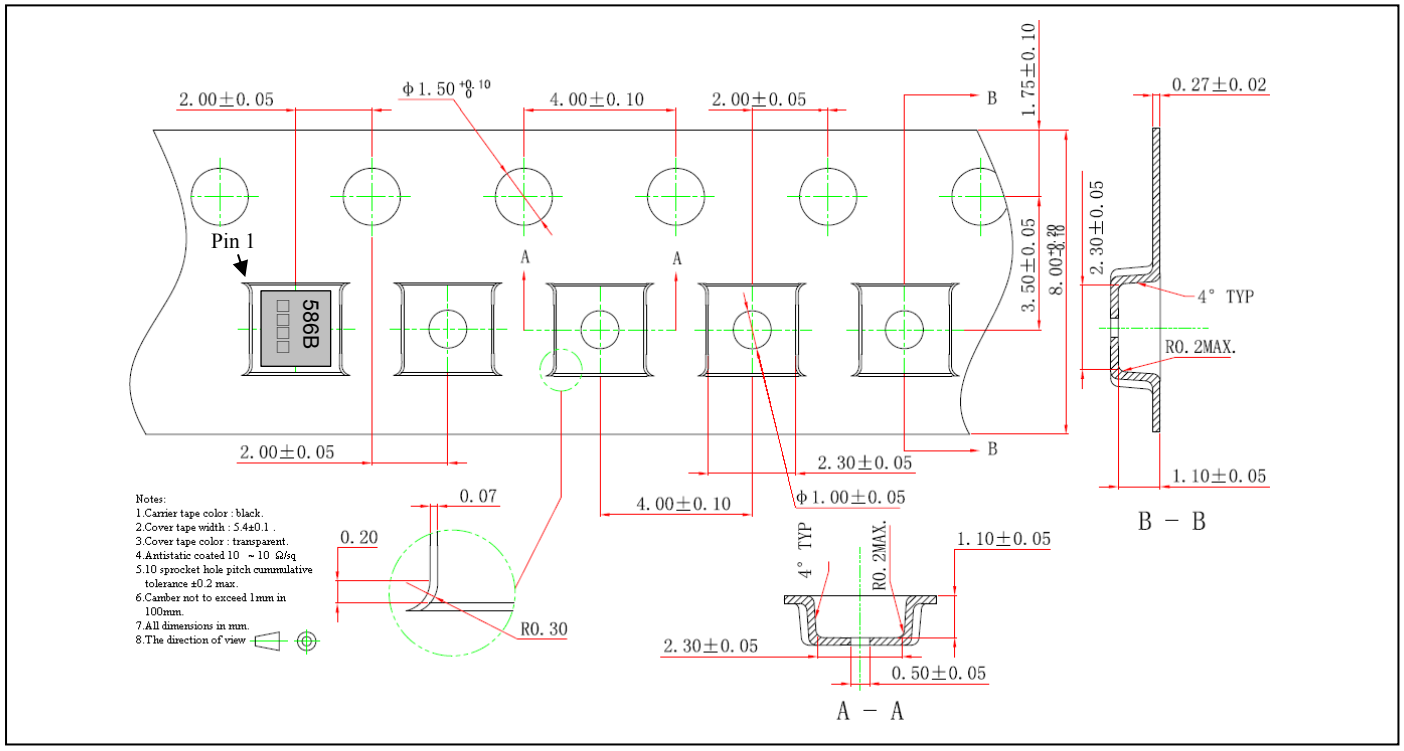


Unit : mm

Reel Dimension



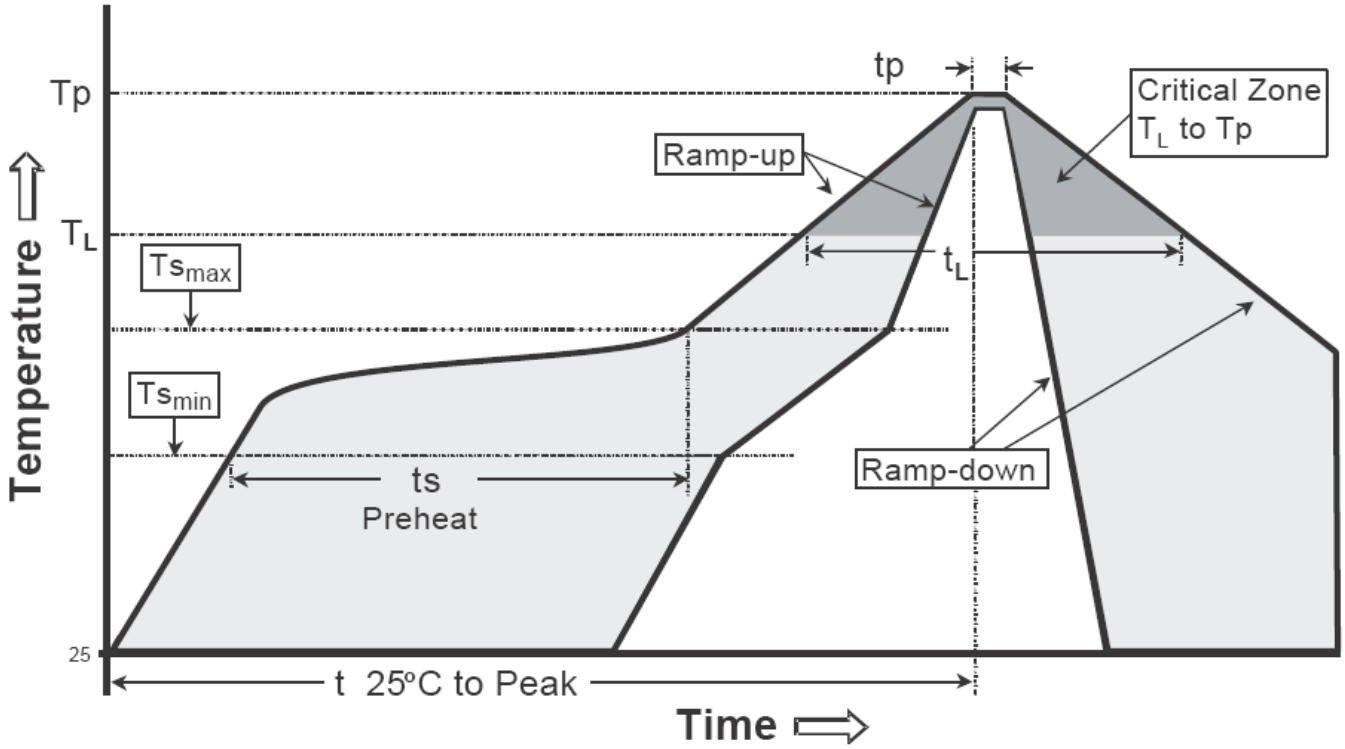
Carrier Tape Dimension



Recommended wave soldering condition

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

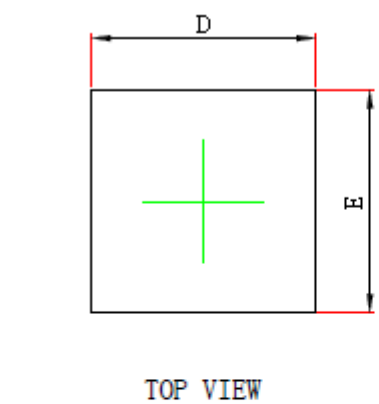
Recommended temperature profile for IR reflow

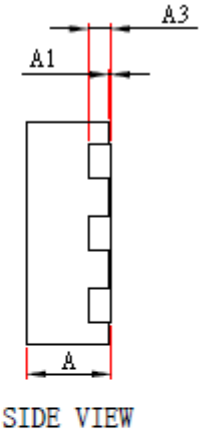


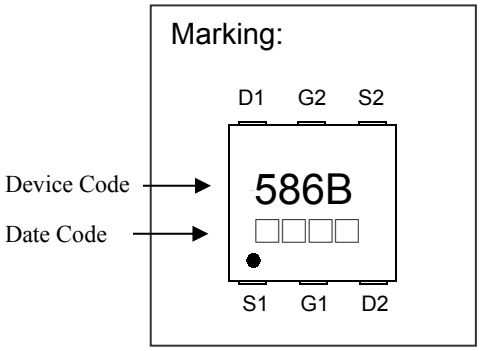
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(TP)	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.

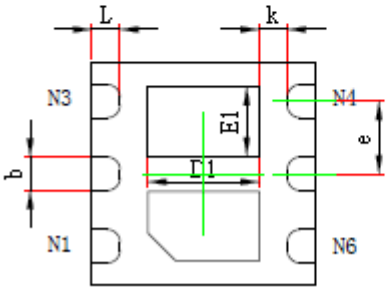
DFN2x2-6L Dimension







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

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

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031	E1	0.520	0.720	0.020	0.028
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	1.900	2.100	0.075	0.083	e	0.650	TYP	0.026	TYP
E	1.900	2.100	0.075	0.083	L	0.200	0.300	0.008	0.012
D1	0.900	1.100	0.035	0.043					

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.