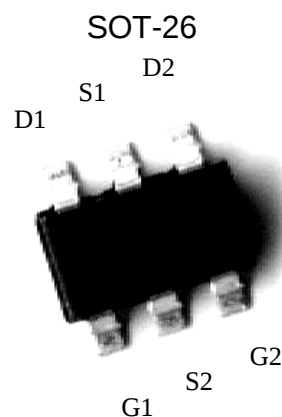


N- And P-Channel Enhancement Mode Power MOSFET

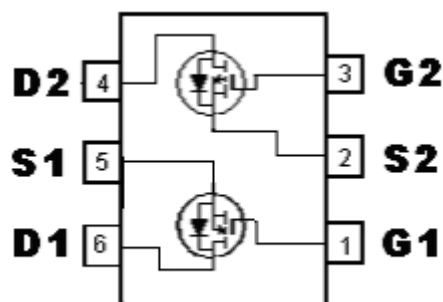
Features:

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

Outline



Equivalent Circuit



G : Gate S : Source D : Drain

	N-CH	P-CH
BV_{DSS}	14V	-14V
$I_D @ T_A=25^\circ C$	5.4A ($V_{GS}=4.5V$)	-3.6A ($V_{GS}=-4.5V$)
$R_{DS(on)(TYP.)}$	17.6m Ω ($V_{GS}=4.5V$)	45.1m Ω ($V_{GS}=-4.5V$)
	24.7m Ω ($V_{GS}=2.5V$)	65.6m Ω ($V_{GS}=-2.5V$)

Ordering Information

Device	Package	Shipping
KWC3588N6	SOT-26 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

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	5.4	-3.6	A
Continuous Drain Current @T _A =70 °C (Note 1)		4.3	-2.9	
Pulsed Drain Current (Note 2)	I _{DM}	20	-20	
Total Power Dissipation (Note 1)	P _D	1.14		W
Linear Derating Factor		0.01		W / °C
Operating Junction and Storage Temperature	T _j , T _{stg}	-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.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	14	-	-	V	V _{GS} =0V, I _D =250μA
ΔBV _{DSS} /ΔT _j	-	8	-	mV/°C	Reference to 25°C, I _D =1mA
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, T _j =70°C
*R _{DS(ON)}	-	17.6	25	mΩ	I _D =5A, V _{GS} =4.5V
	-	24.7	33		I _D =4.6A, V _{GS} =2.5V
*G _{FS}	-	5.6	-	S	V _{DS} =5V, I _D =3A
Dynamic					
C _{iss}	-	407	-	pF	V _{DS} =10V, V _{GS} =0V, f=1MHz
C _{oss}	-	115	-		
C _{rss}	-	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	-		
*Q _g	-	6.5	-	nC	V _{DS} =10V, I _D =3A, V _{GS} =4.5V
*Q _{gs}	-	0.7	-		
*Q _{gd}	-	2.3	-		
R _g	-	1	-	Ω	f=1MHz
Source-Drain Diode					
*V _{SD}	-	0.87	1.2	V	V _{GS} =0V, I _S =5.2A
*t _{rr}	-	12	-	ns	I _F =3A, V _{GS} =0V, dI _F /dt=100A/μs
*Q _{rr}	-	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
ΔBV _{DSS} /ΔTj	-	-5	-	mV/°C	Reference to 25°C, I _D =-1mA
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} =0, Tj=70°C
*R _{DS(ON)}	-	45.1	60	mΩ	I _D =-3.6A, V _{GS} =-4.5V
	-	65.6	87		I _D =-3.2A, V _{GS} =-2.5V
*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	-		
*td(ON)	-	5	-	ns	V _{DS} =-10V, I _D =-1A, V _{GS} =-5V, R _G =3.3Ω
*tr	-	18.8	-		
*td(OFF)	-	49.6	-		
*tf	-	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%

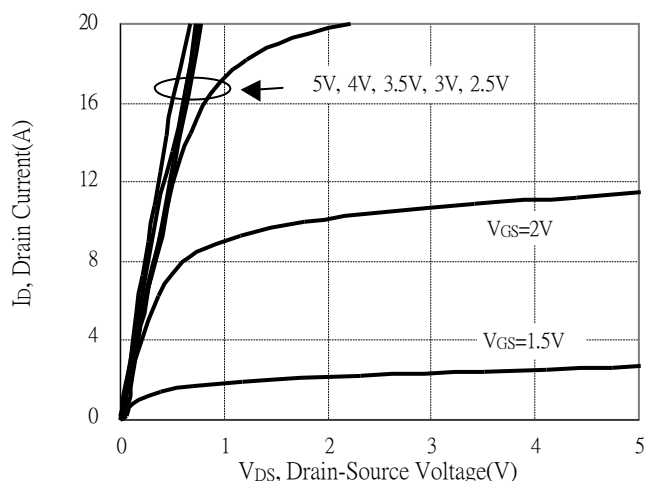
Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	80	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{θJA}	110 (Note)	

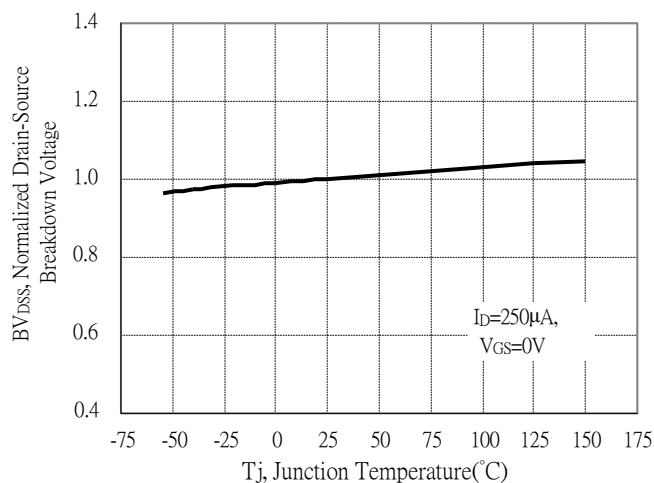
Note : Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec; 180°C/W when mounted on minimum copper pad

N-channel Typical Characteristics

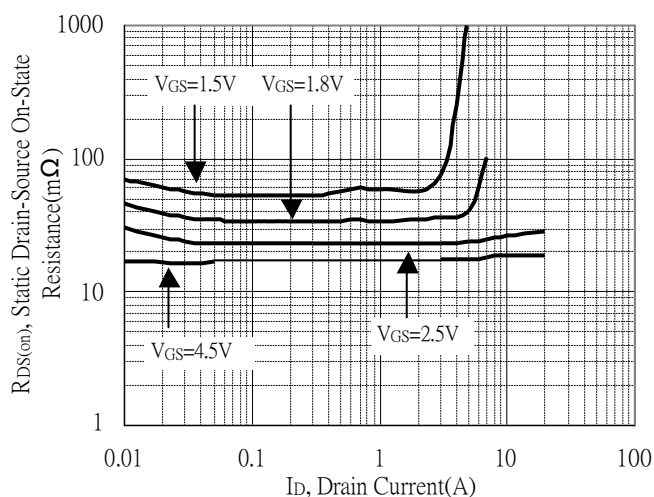
Typical Output Characteristics



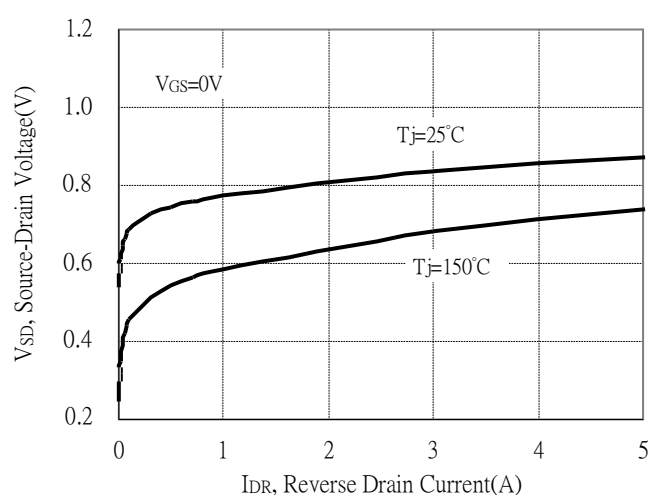
Breakdown Voltage vs Ambient Temperature



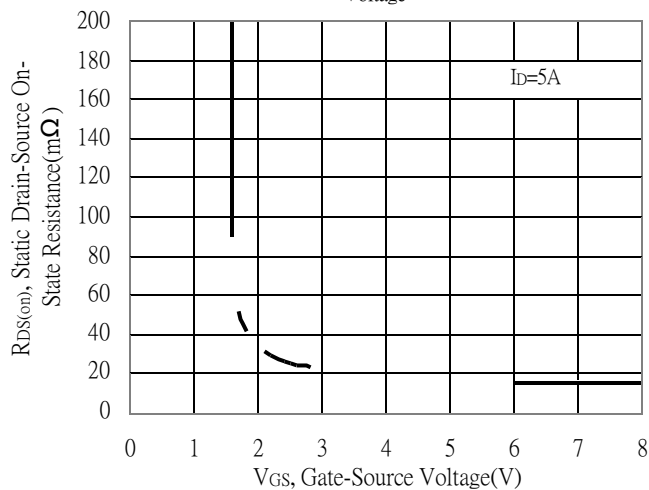
Static Drain-Source On-State resistance vs Drain Current



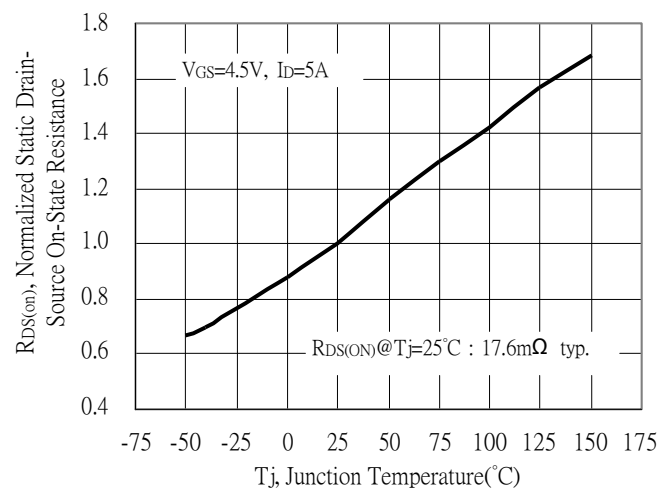
Reverse Drain Current vs Source-Drain Voltage



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

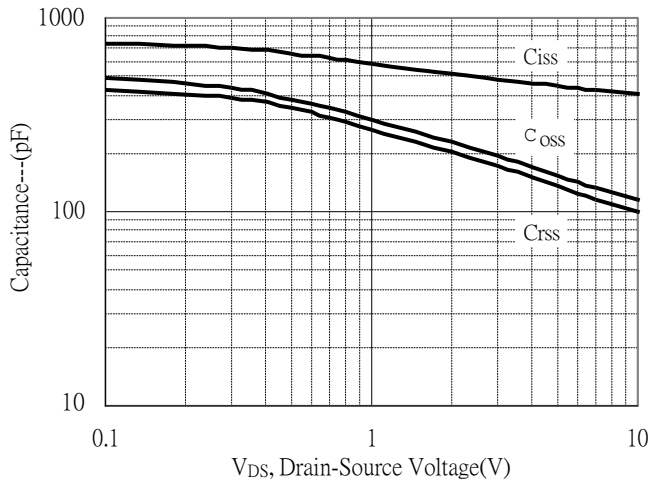


Drain-Source On-State Resistance vs Junction Temperature

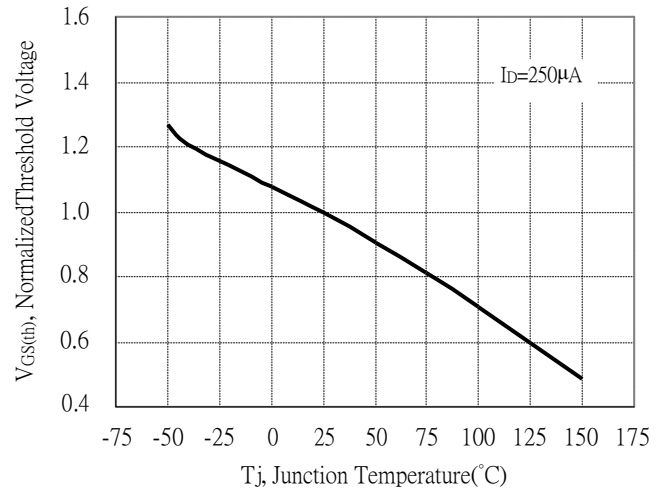


N-channel Typical Characteristics(Cont.)

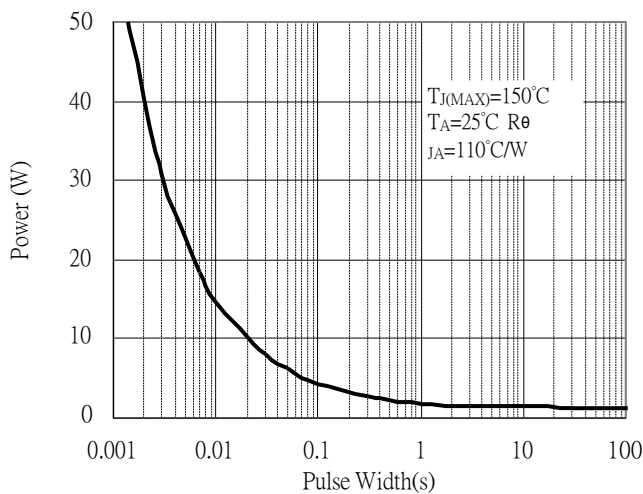
Capacitance vs Drain-to-Source Voltage



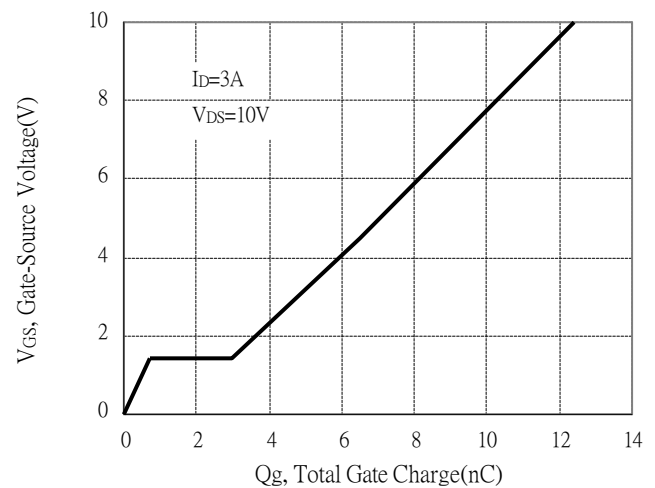
Threshold Voltage vs Junction Temperature



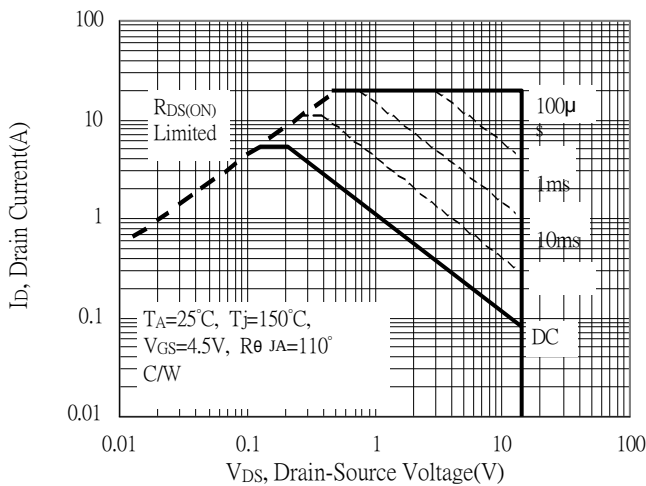
Single Pulse Power Rating, Junction to Ambient



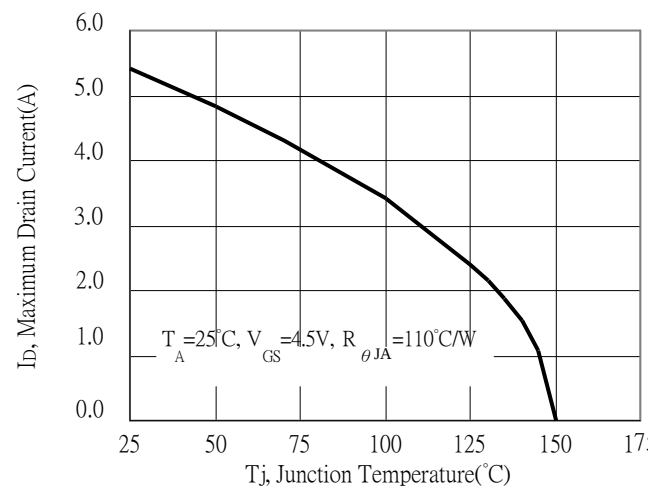
Gate Charge Characteristics



Maximum Safe Operating Area

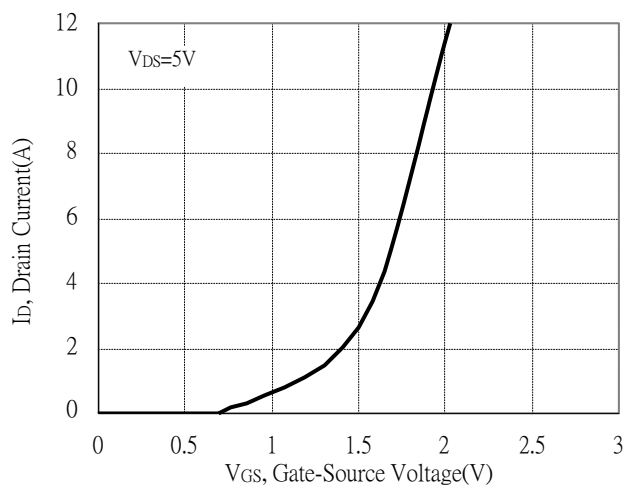


Maximum Drain Current vs Junction Temperature

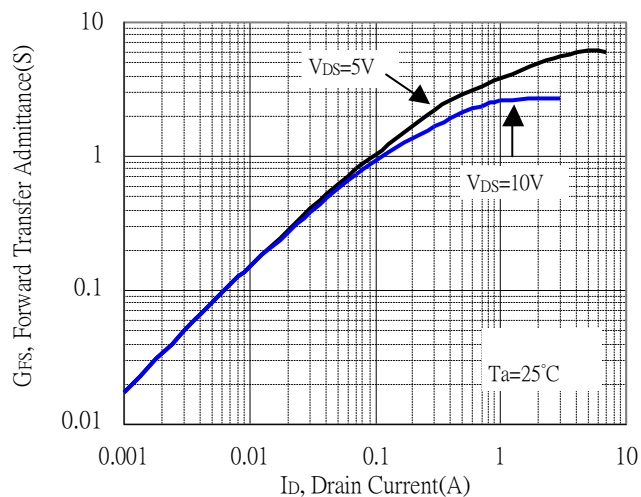


N-channel Typical Characteristics(Cont.)

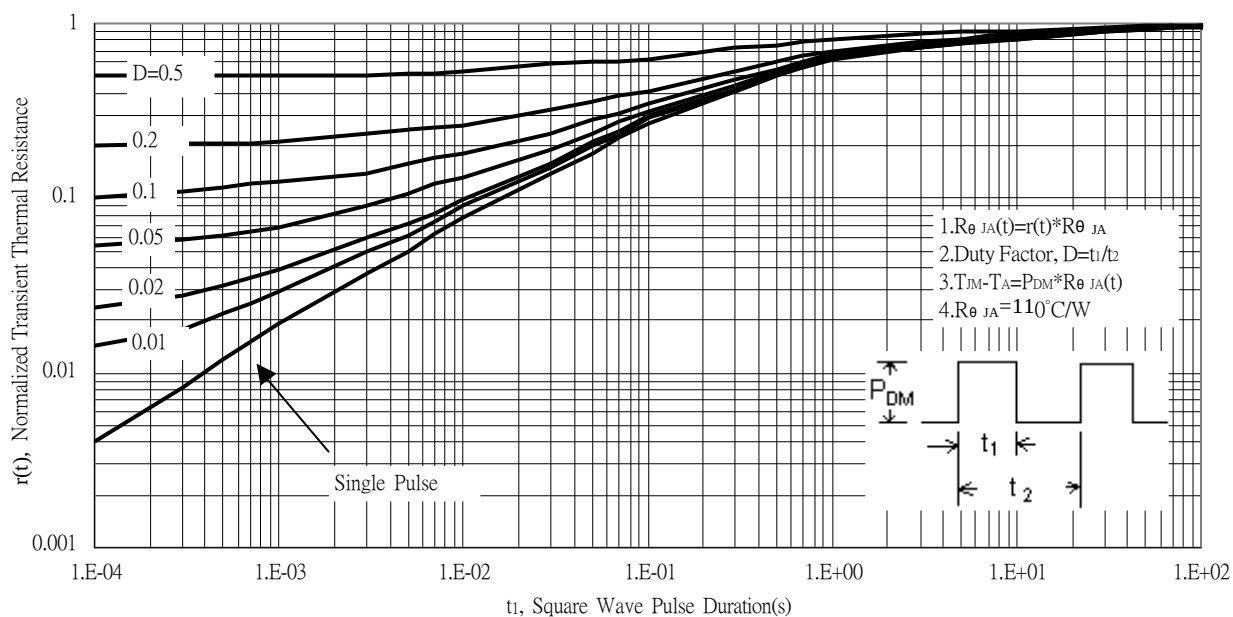
Typical Transfer Characteristics



Forward Transfer Admittance vs Drain Current

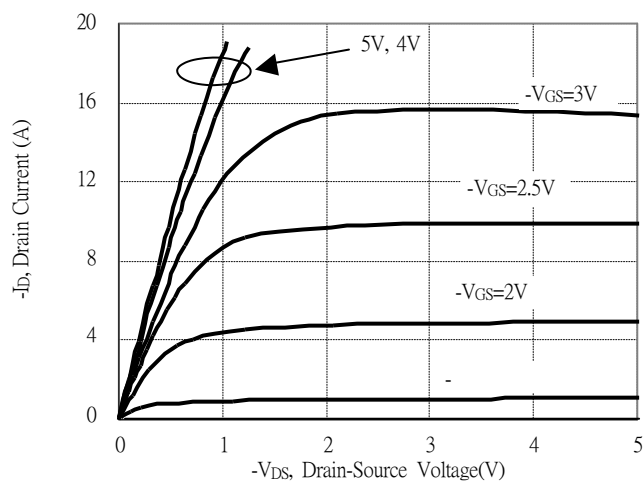


Transient Thermal Response Curves

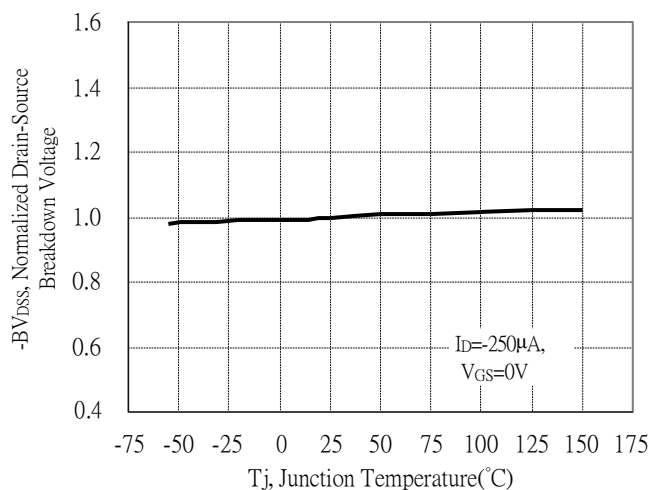


P-channel Typical Characteristics

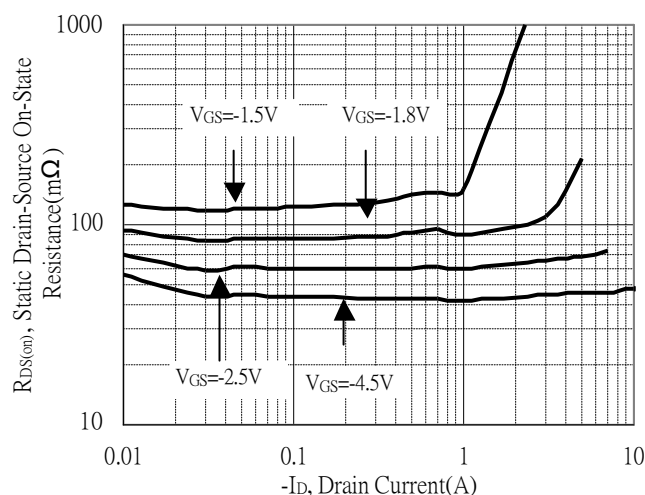
Typical Output Characteristics



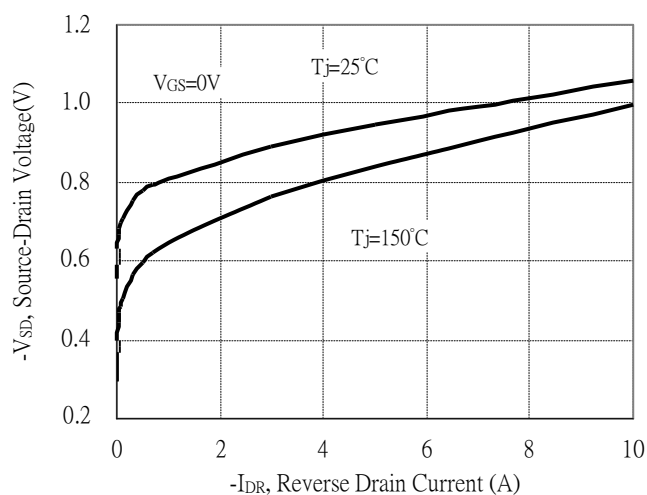
Breakdown Voltage vs Ambient Temperature



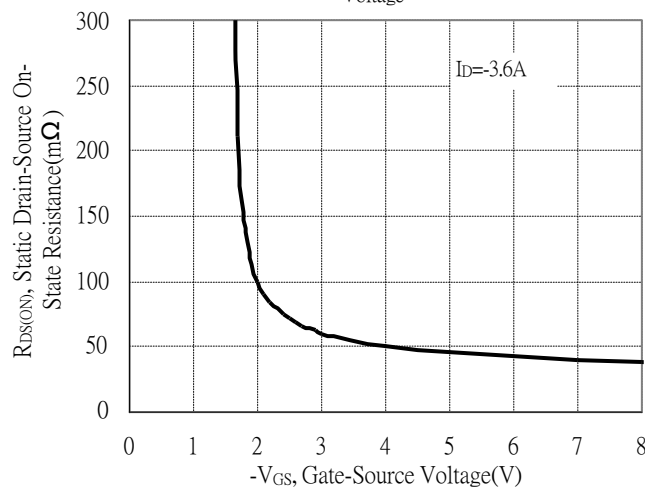
Static Drain-Source On-State resistance vs Drain Current



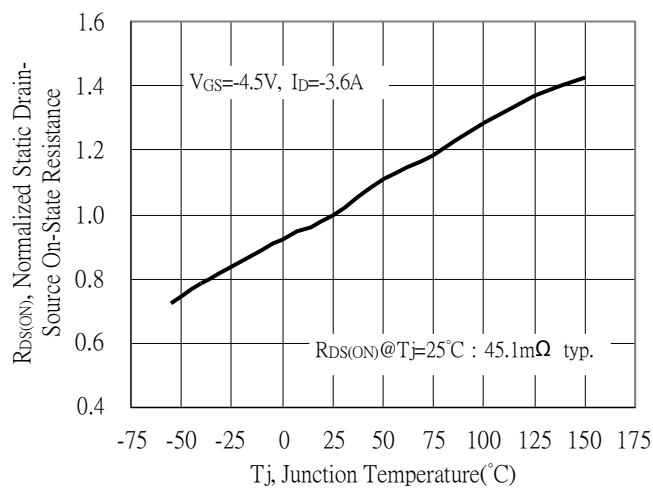
Reverse Drain Current vs Source-Drain Voltage



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

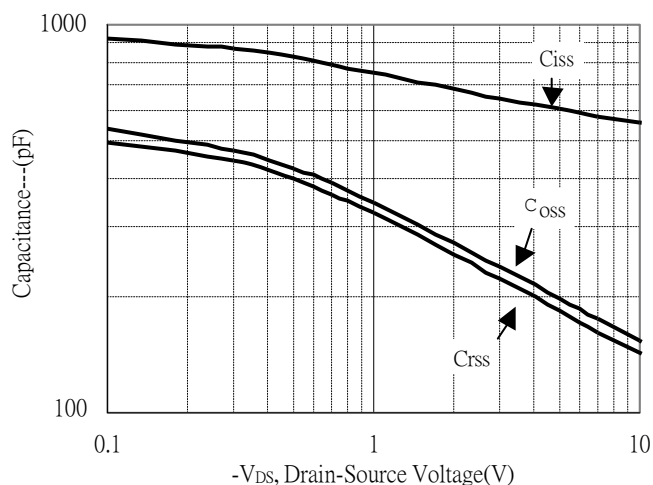


Drain-Source On-State Resistance vs Junction Temperature

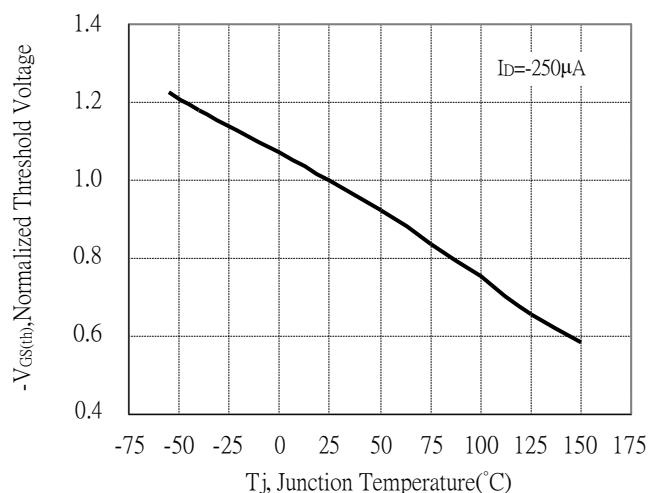


P-channel Typical Characteristics(Cont.)

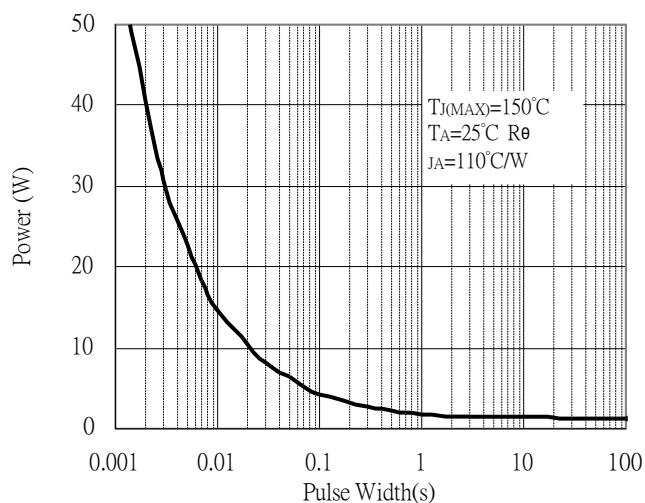
Capacitance vs Drain-to-Source Voltage



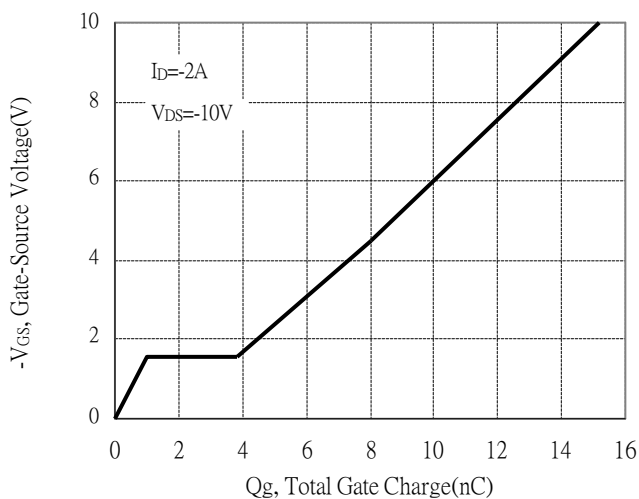
Threshold Voltage vs Junction Temperature



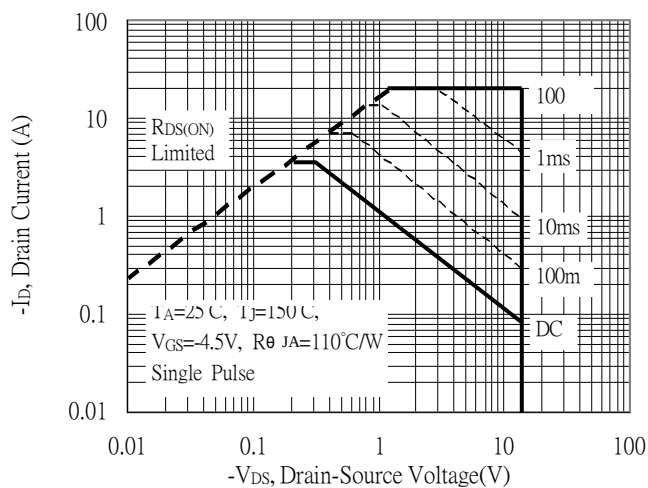
Single Pulse Power Rating, Junction to Ambient



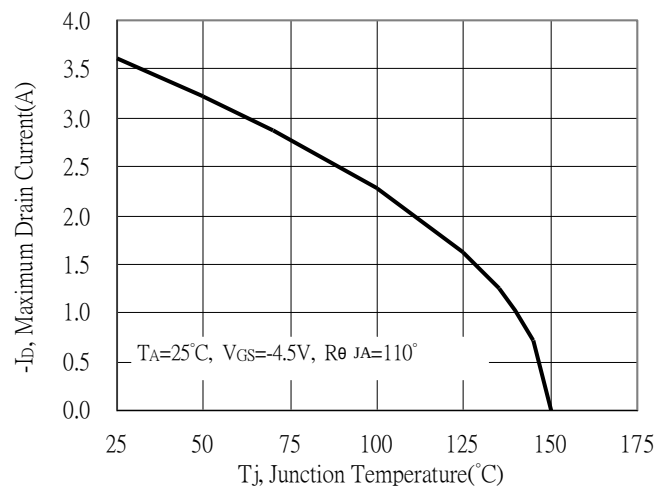
Gate Charge Characteristics



Maximum Safe Operating Area

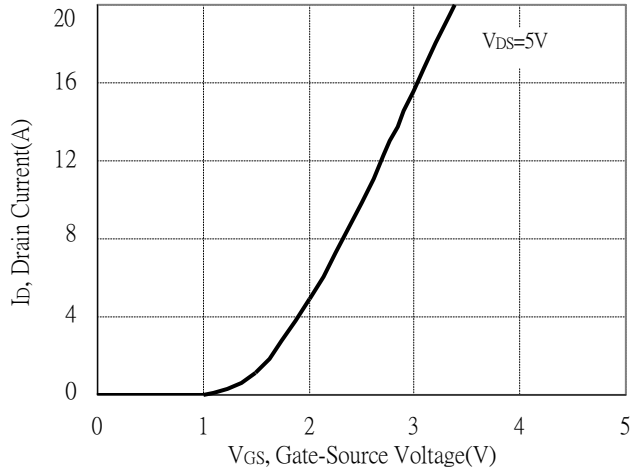


Maximum Drain Current vs Junction Temperature

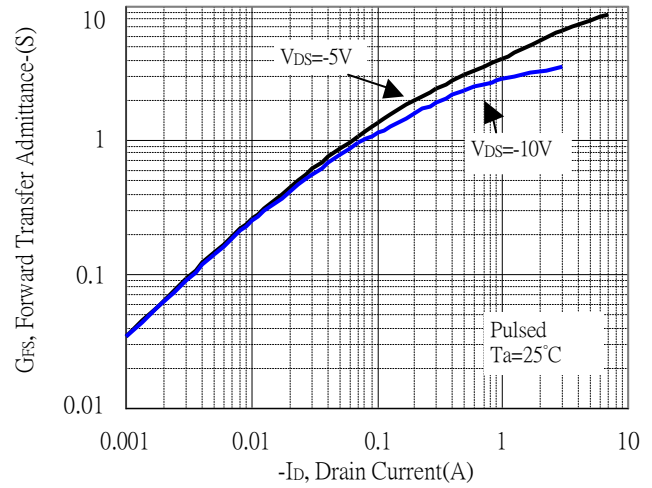


P-channel Typical Characteristics(Cont.)

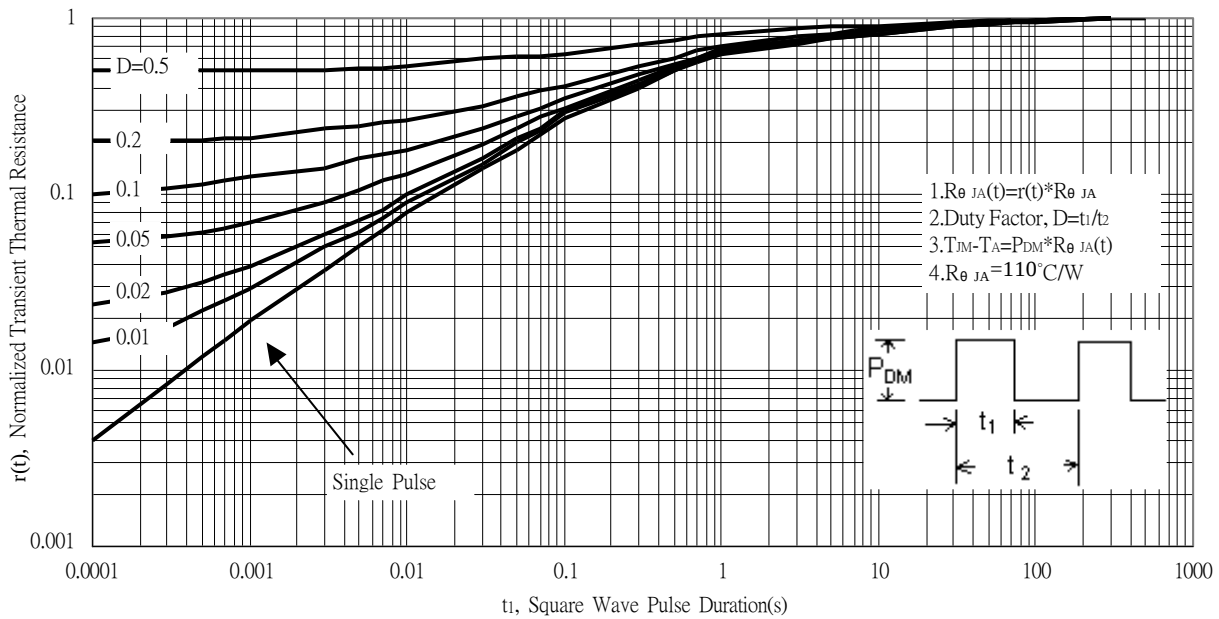
Typical Transfer Characteristics



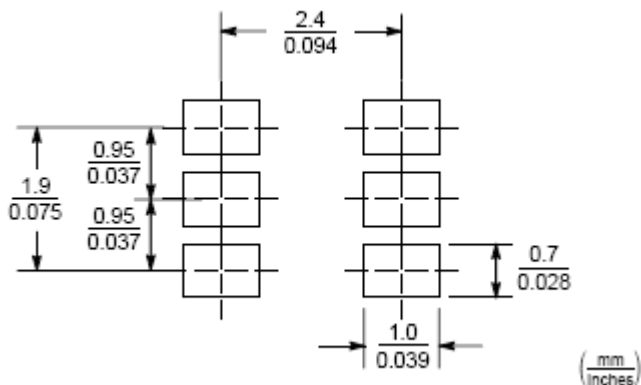
Forward Transfer Admittance vs Drain Current



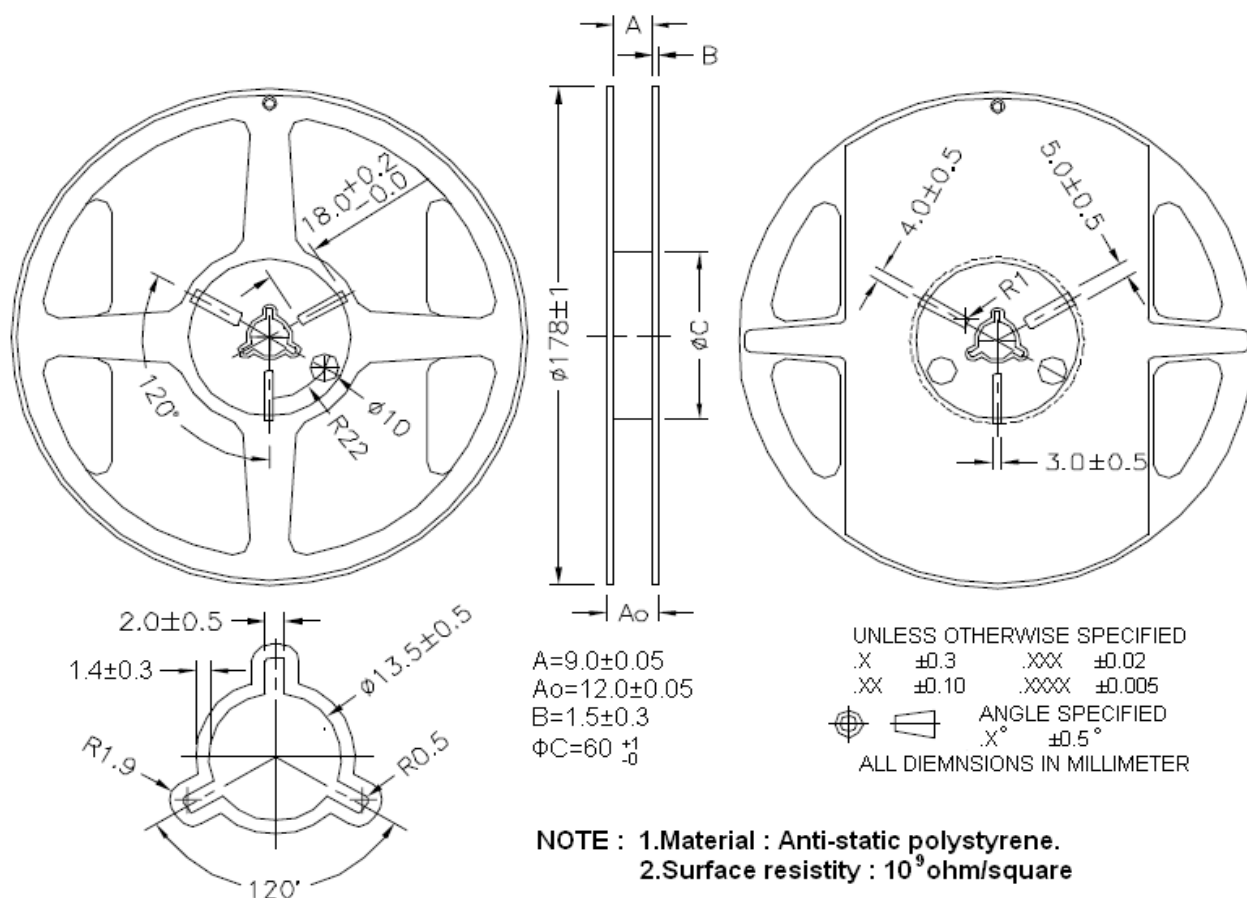
Transient Thermal Response Curves



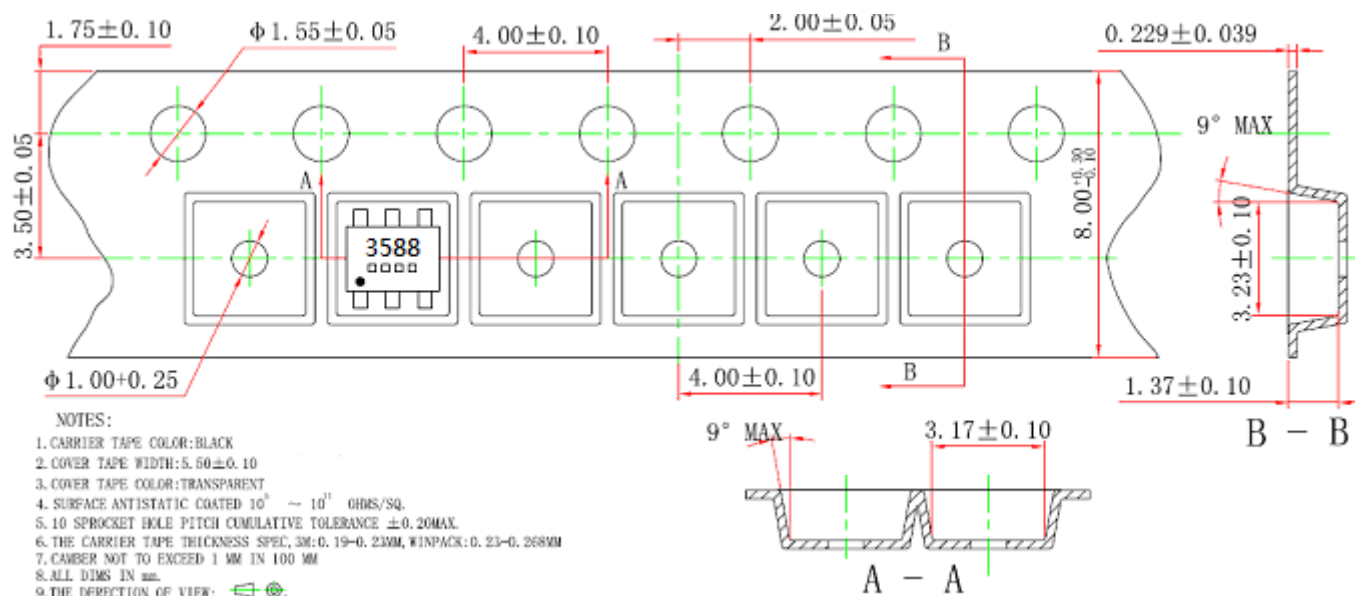
Recommended Soldering Footprint



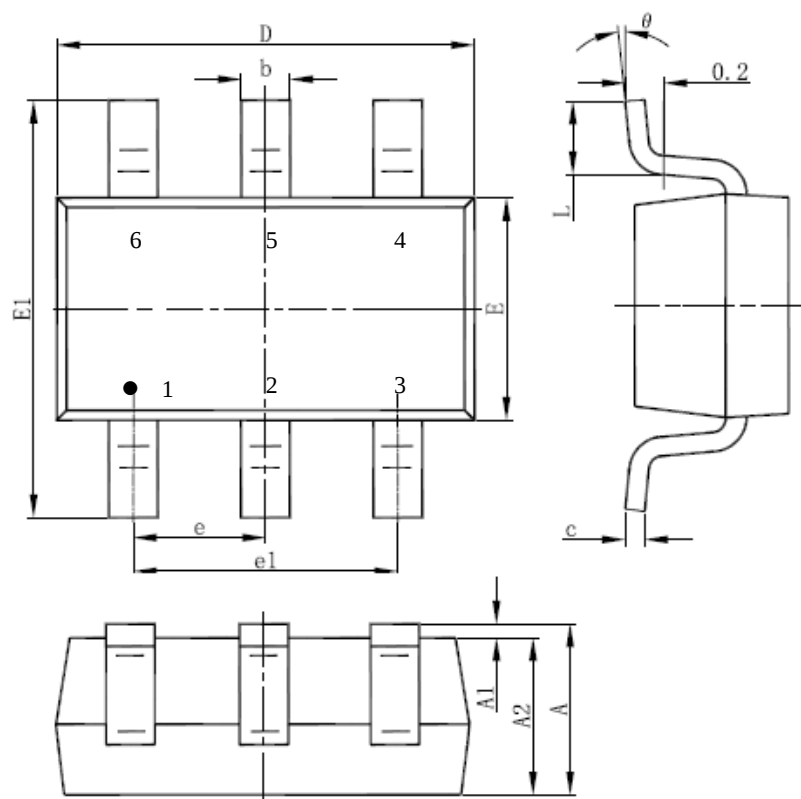
Reel Dimension



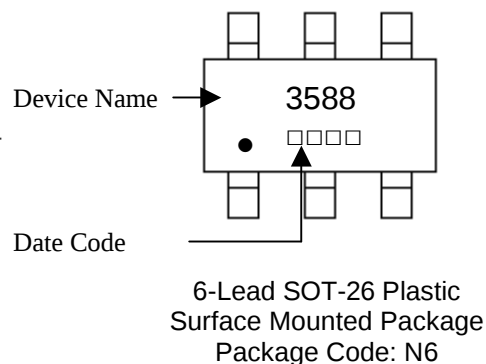
Carrier Tape Dimension



SOT-26 Dimension



Marking:



Style:

- Pin 1. Gate1 (G1)
- Pin 2. Source 2 (S2)
- Pin 3. Gate 2 (G2)
- Pin 4. Drain 2 (D2)
- Pin 5. Source 1 (S1)
- Pin 6. Drain 1 (D1)

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049	E	1.500	1.700	0.059	0.067
A1	0.000	0.100	0.000	0.004	E1	2.650	2.950	0.104	0.116
A2	1.050	1.150	0.041	0.045	e	0.950 (BSC)		0.037 (BSC)	
b	0.300	0.500	0.012	0.020	e1	1.800	2.000	0.071	0.079
c	0.100	0.200	0.004	0.008	L	0.300	0.600	0.012	0.024
D	2.820	3.020	0.111	0.119	θ	0°	8°	0°	8°