

N- AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

SOT-26

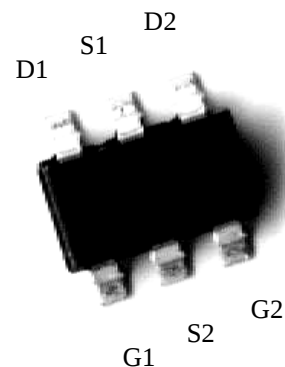
Features:

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

Description

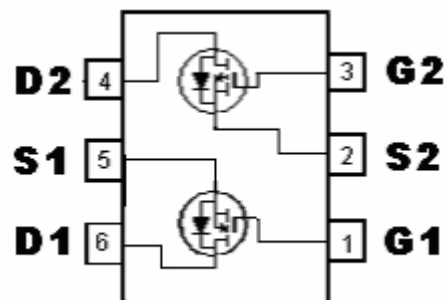
The KW3585N6 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single SOT-26 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The SOT-26 package is universally preferred for all commercial-industrial surface mount applications.



Equivalent Circuit

KW3585N6



G : Gate

S : Source

D : Drain

	N-CH	P-CH
BV _{DSS}	20V	-20V
I _D	4.5A(V _{GS} =4.5V)	-3A(V _{GS} =-4.5 V)
R _{DS(on)} (TYP.)	27mΩ (V _{GS} =4.5V)	78mΩ (V _{GS} =-4.5V)
	37mΩ (V _{GS} =2.5V)	115mΩ (V _{GS} =-2.5V)
	82mΩ (V _{GS} =1.5V)	280mΩ (V _{GS} =-1.5V)

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Breakdown Voltage	BV _{DSS}	20	-20	V
Gate-Source Voltage	V _{GS}	±12	±12	V
Continuous Drain Current @T _A =25 °C (Note 1)	I _D	4.5	-3	A
Continuous Drain Current @T _A =70 °C (Note 1)	I _D	3.6	-2.4	A
Pulsed Drain Current (Note 2)	I _{DM}	20	-20	A
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 (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	20	-	-	V	V _{GS} =0, I _D =250μA
ΔBV _{DSS} /ΔT _j	-	0.02	-	V/°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} =±12V, V _{DS} =0
I _{DSS}	-	-	1	μA	V _{DS} =20V, V _{GS} =0
	-	-	10		V _{DS} =16V, V _{GS} =0, T _j =70°C
*R _{DS(ON)}	-	27	40	mΩ	I _D =3.5A, V _{GS} =4.5V
	-	37	50		I _D =1.2A, V _{GS} =2.5V
	-	82	105		I _D =0.5A, V _{GS} =1.5V
*G _{FS}	-	7	-	S	V _{DS} =5V, I _D =3A
Dynamic					
C _{iss}	-	423	-	pF	V _{DS} =20V, V _{GS} =0, f=1MHz
C _{oss}	-	50	-		
C _{rss}	-	48	-		
*t _{d(ON)}	-	6	-	ns	V _{DS} =15V, I _D =1A, V _{GS} =5V, R _G =3.3Ω, R _D =15Ω
*t _r	-	8	-		
*t _{d(OFF)}	-	11	-		
*t _f	-	10	-		
*Q _g	-	6	-	nC	V _{DS} =16V, I _D =3A, V _{GS} =4.5V
*Q _{gs}	-	0.8	-		
*Q _{gd}	-	2.5	-		
Source-Drain Diode					
*V _{SD}	-	0.77	1.2	V	V _{GS} =0V, I _S =1.2A
*t _{rr}	-	16	-	ns	I _S =3A, V _{GS} =0V, dI/dt=100A/μs
*Q _{rr}	-	8	-	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}	-20	-	-	V	V _{GS} =0, I _D =-250μA
ΔBV _{DSS} /ΔT _j	-	-0.01	-	V/°C	Reference to 25°C, I _D =-1mA
V _{GS(th)}	-	-0.8	-1.2	V	V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±12V, V _{DS} =0
I _{DSS}	-	-	-1	μA	V _{DS} =-20V, V _{GS} =0
	-	-	-25		V _{DS} =-16V, V _{GS} =0, T _j =70°C
*R _{DS(ON)}	-	78	105	mΩ	I _D =-2.5A, V _{GS} =-4.5V
	-	115	150		I _D =-2A, V _{GS} =-2.5V
	-	280	350		I _D =-0.5A, V _{GS} =-1.5V
*G _{FS}	-	5	-	S	V _{DS} =-5V, I _D =-2A
Dynamic					
C _{iss}	-	429	-	pF	V _{DS} =-20V, V _{GS} =0, f=1MHz
C _{oss}	-	45	-		
C _{rss}	-	41	-		
*t _{d(ON)}	-	6	-	ns	V _{DS} =-10V, I _D =-1A, V _{GS} =-10V, R _G =3.3Ω, R _D =10Ω
*t _r	-	17	-		
*t _{d(OFF)}	-	16	-		
*t _f	-	5	-		
*Q _g	-	6	-	nC	V _{DS} =-16V, I _D =-2A, V _{GS} =-4.5V
*Q _{gs}	-	0.8	-		
*Q _{gd}	-	2.4	-		
Source-Drain Diode					
*V _{SD}	-	-0.82	-1.2	V	V _{GS} =0V, I _S =-1.2A
*t _{rr}	-	20	-	ns	I _S =-2A, V _{GS} =0V, dI/dt=100A/μs
*Q _{rr}	-	15	-	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)	°C/W

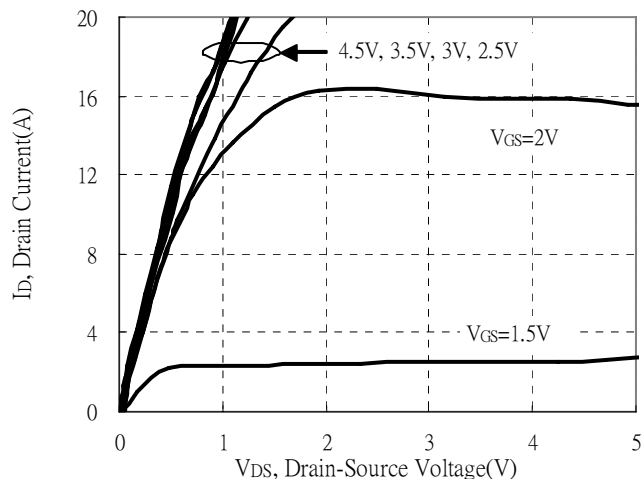
Note : Surface mounted on 1 in² copper pad of FR-4 board, t ≤5 sec; 180°C/W when mounted on minimum copper pad

Ordering Information

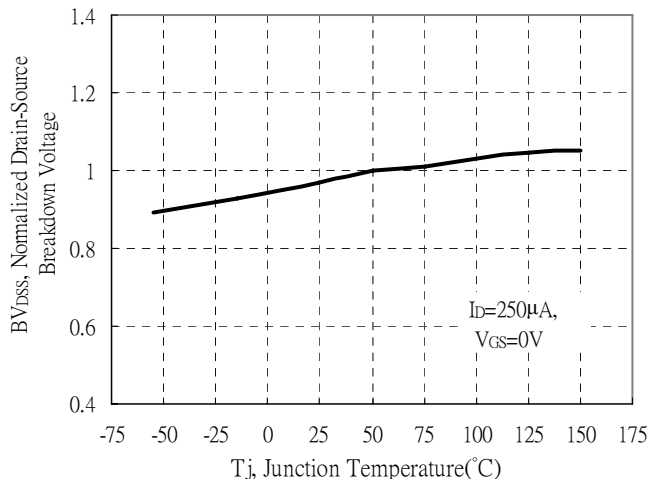
Device	Package	Shipping
KW3585N6-T1-G	SOT-26 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

N-channel Typical Characteristics

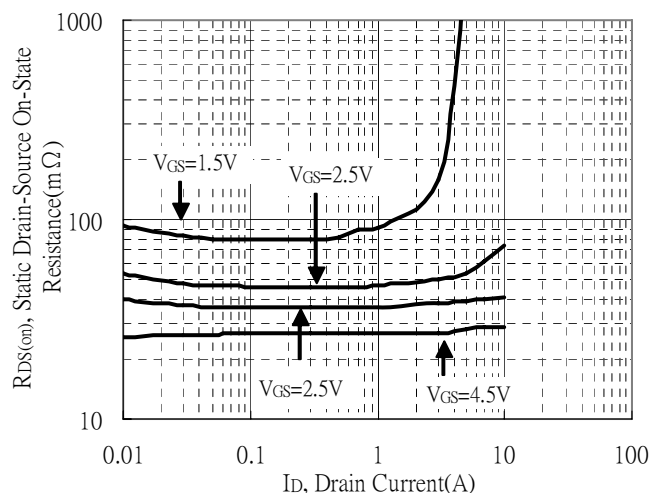
Typical Output Characteristics



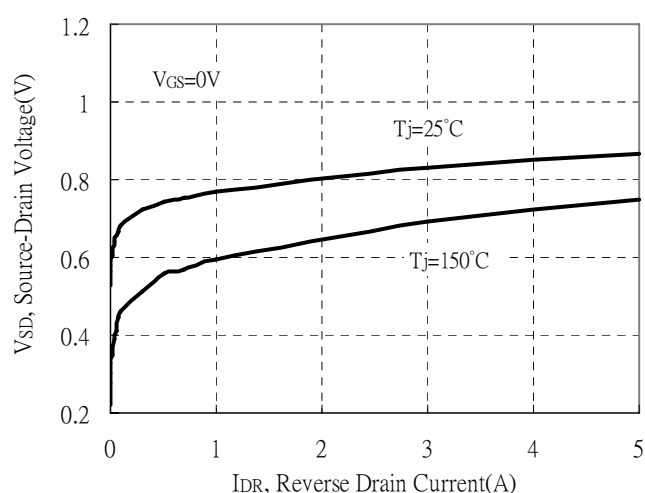
Breakdown Voltage vs Ambient Temperature



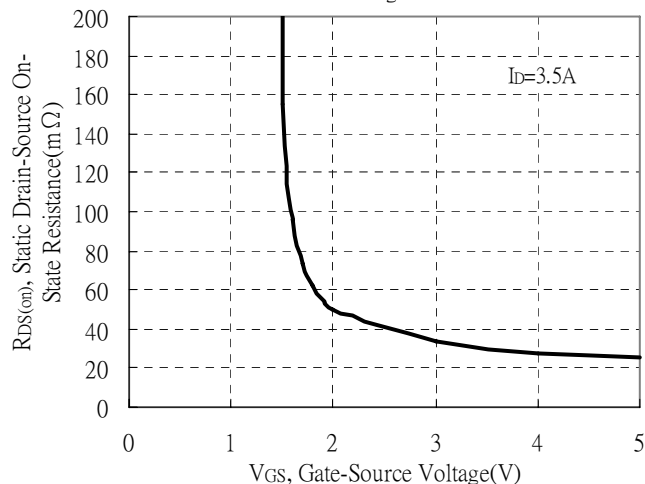
Static Drain-Source On-State resistance vs Drain Current



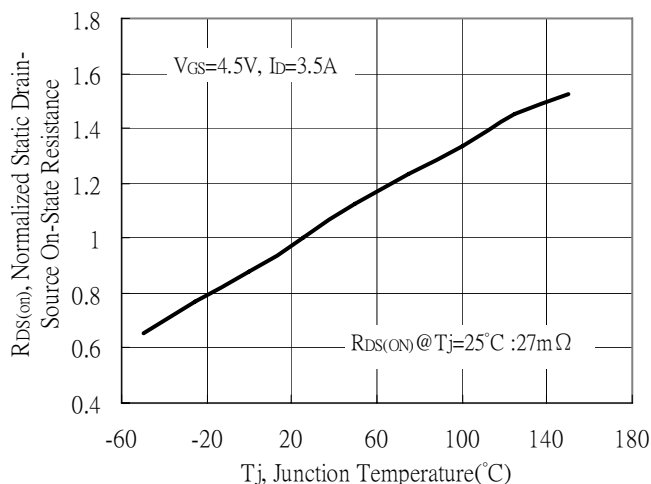
Reverse Drain Current vs Source-Drain Voltage



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

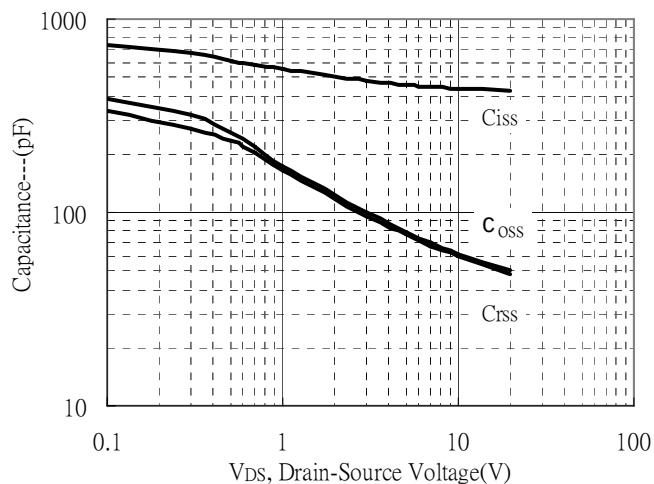


Drain-Source On-State Resistance vs Junction Temperature

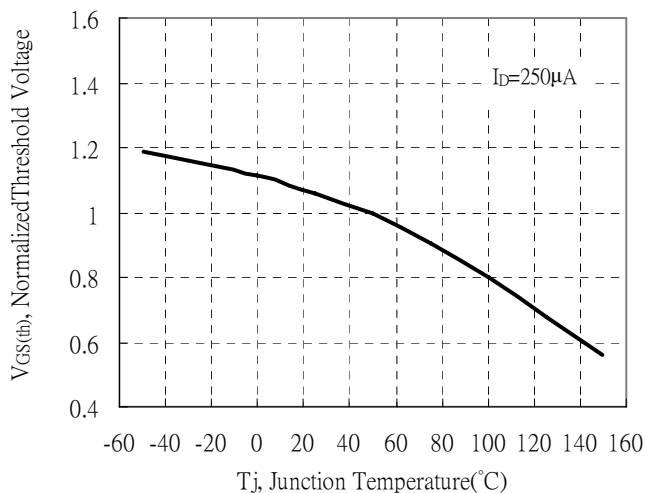


N-channel Typical Characteristics(Cont.)

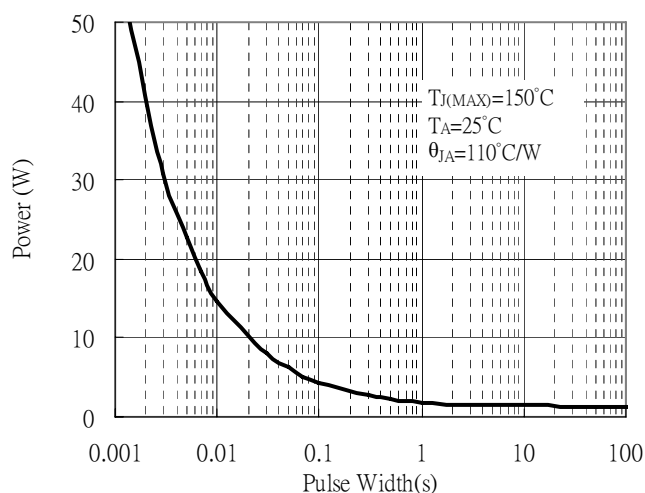
Capacitance vs Drain-to-Source Voltage



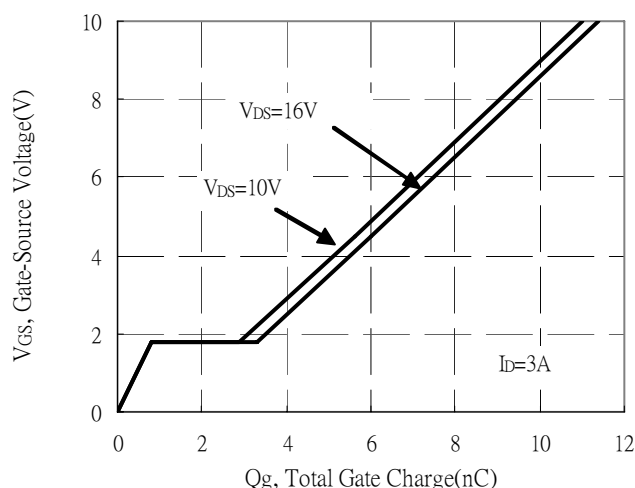
Threshold Voltage vs Junction Temperature



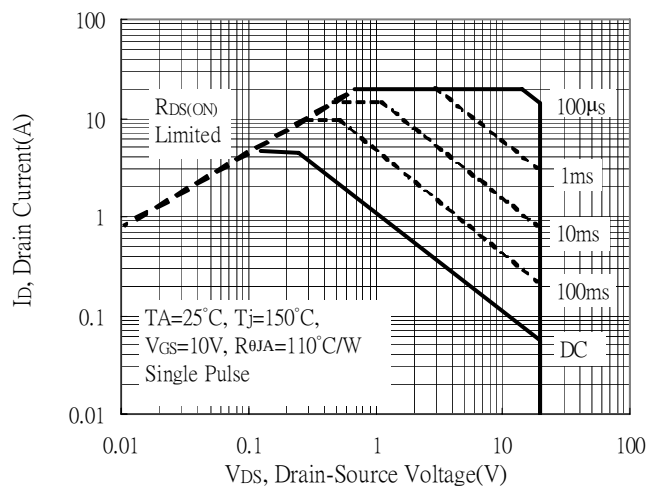
Single Pulse Power Rating, Junction to Ambient



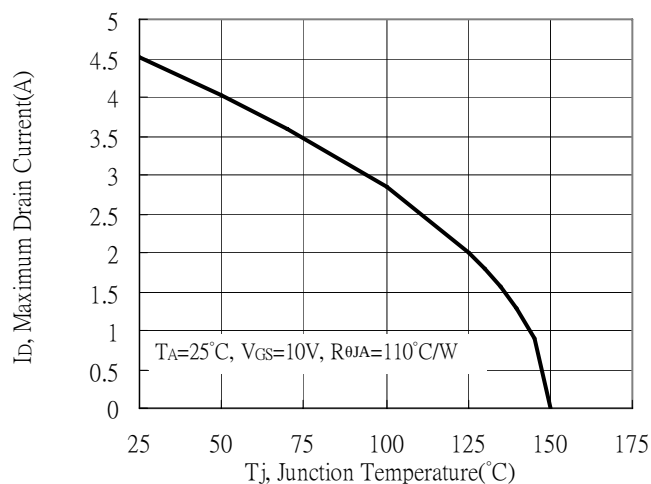
Gate Charge Characteristics



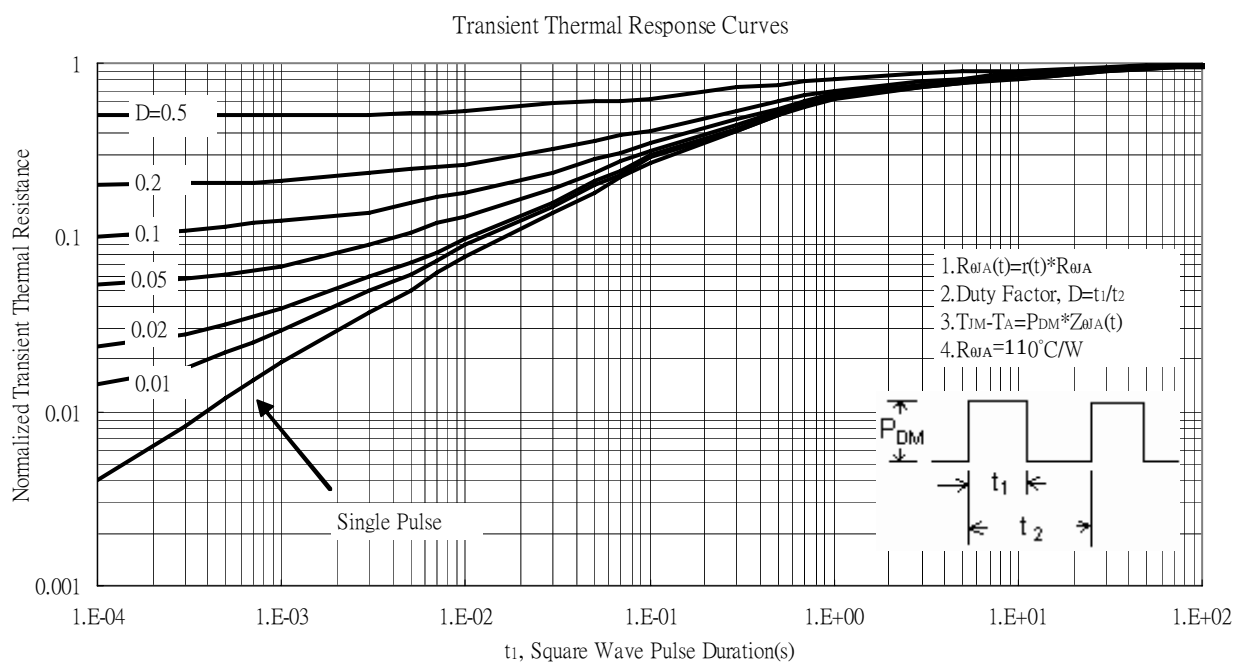
Maximum Safe Operating Area



Maximum Drain Current vs Junction Temperature

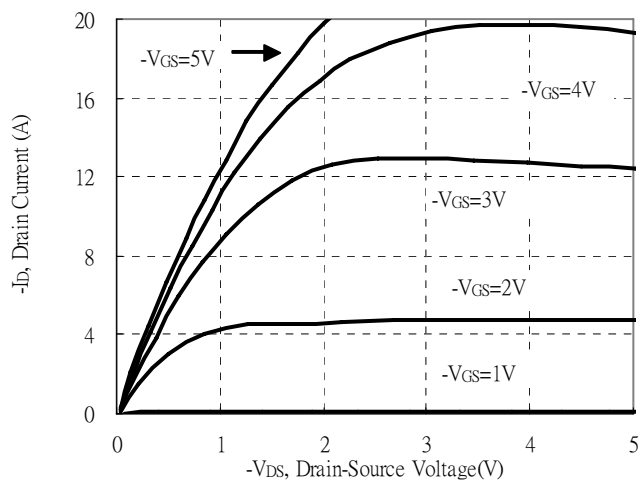


N-channel Typical Characteristics(Cont.)

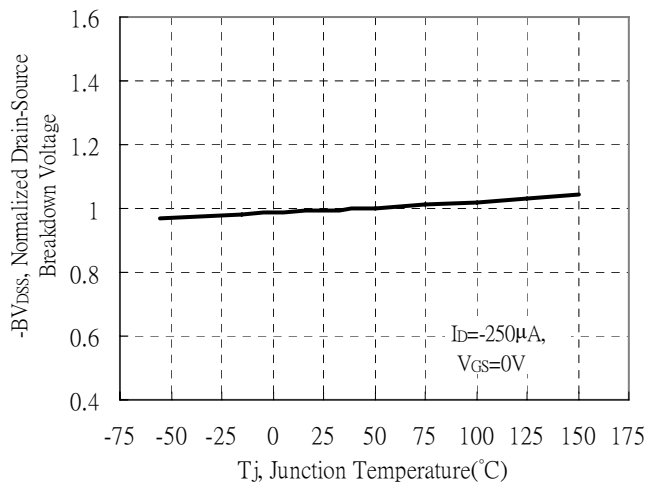


P-channel Typical Characteristics

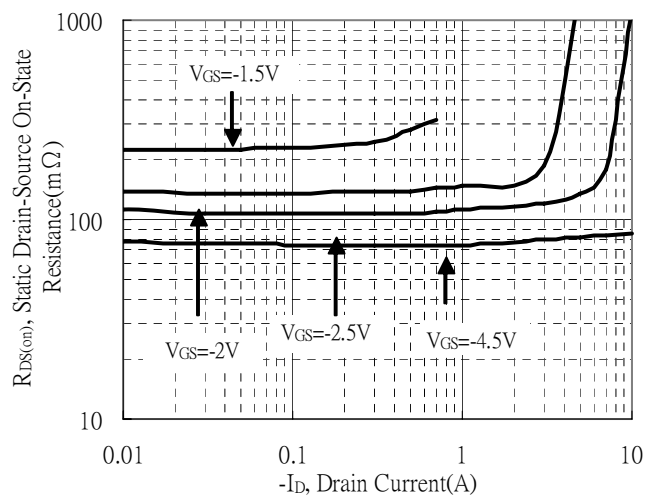
Typical Output Characteristics



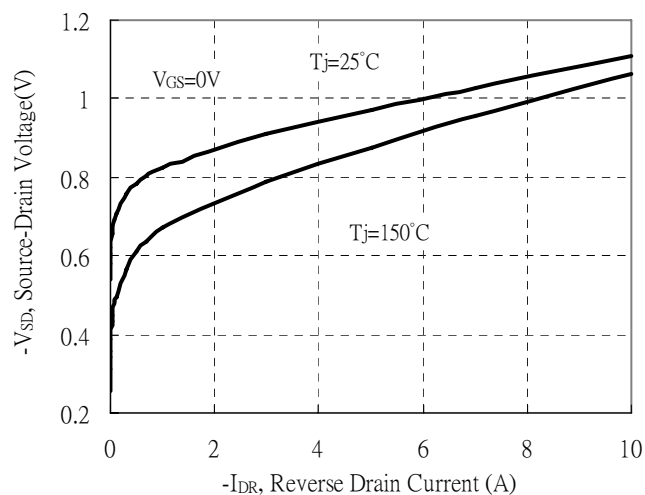
Breakdown Voltage vs Ambient Temperature



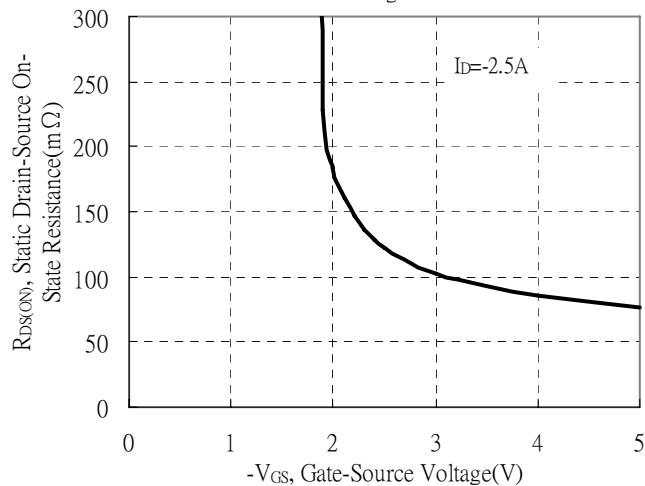
Static Drain-Source On-State resistance vs Drain Current



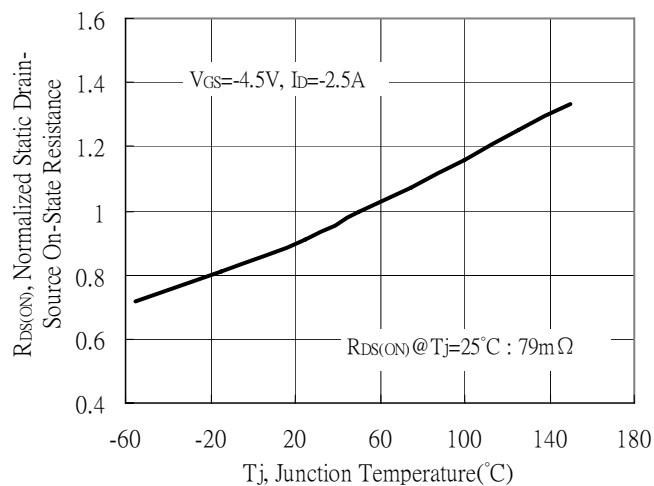
Reverse Drain Current vs Source-Drain Voltage



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

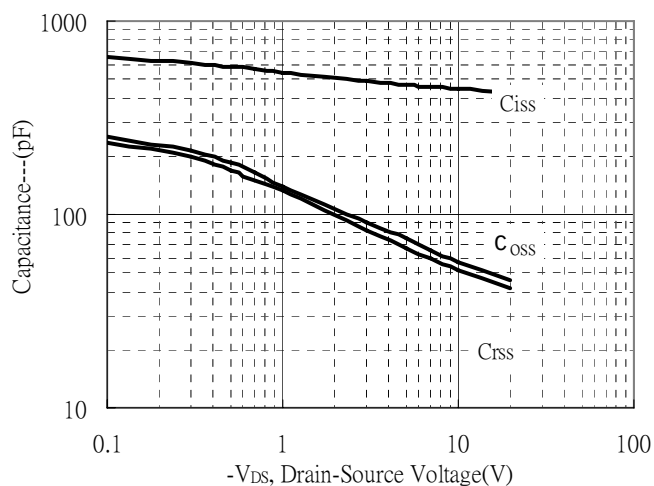


Drain-Source On-State Resistance vs Junction Temperature

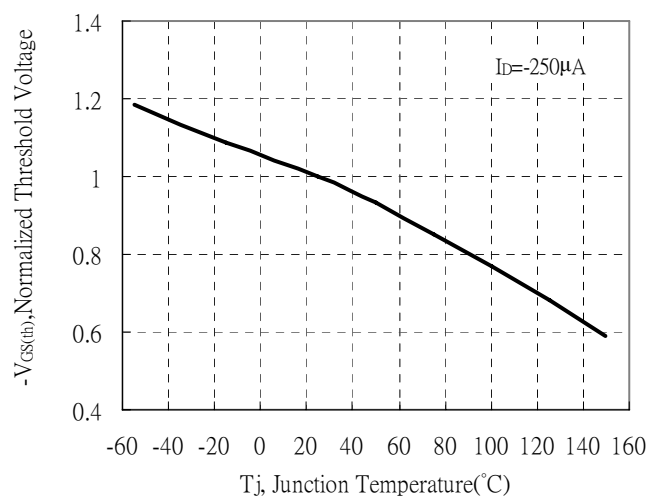


P-channel Typical Characteristics(Cont.)

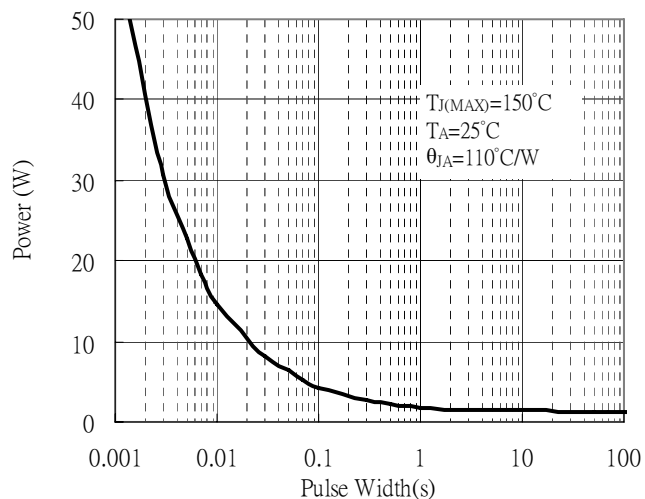
Capacitance vs Drain-to-Source Voltage



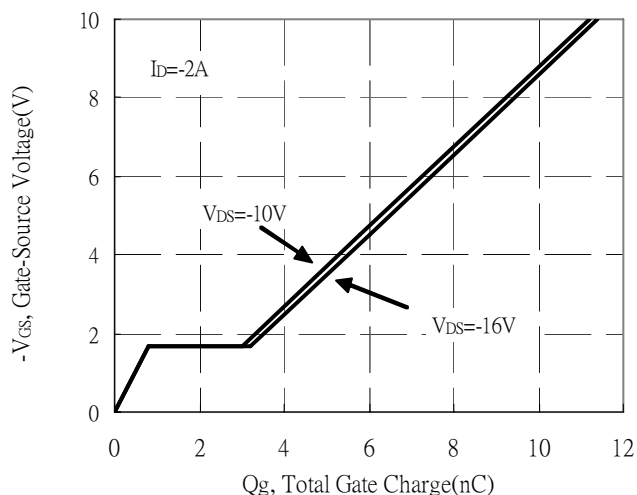
Threshold Voltage vs Junction Temperature



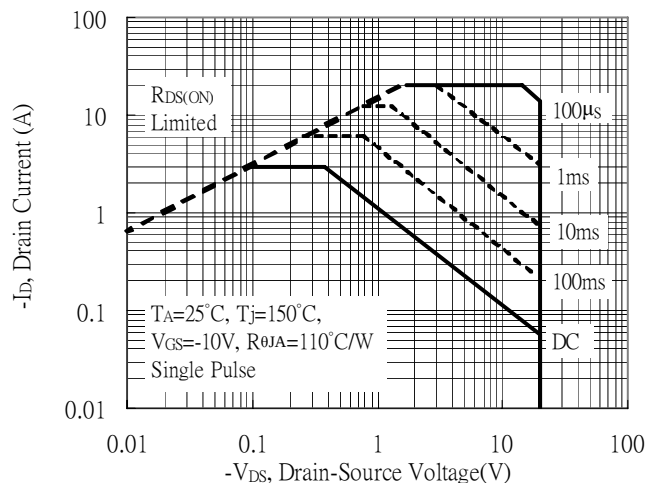
Single Pulse Power Rating, Junction to Ambient



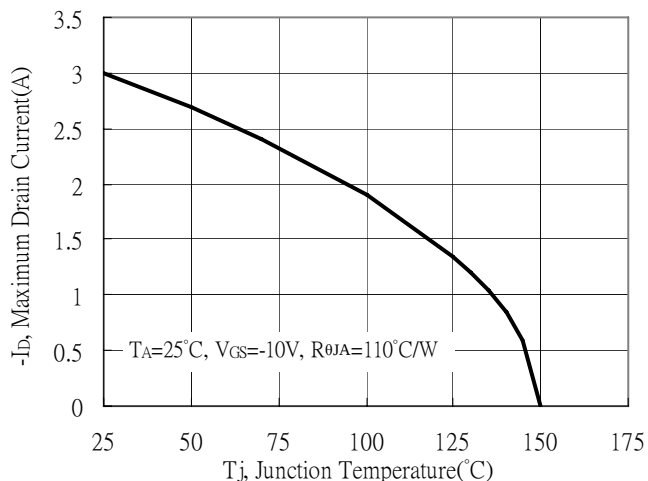
Gate Charge Characteristics



Maximum Safe Operating Area

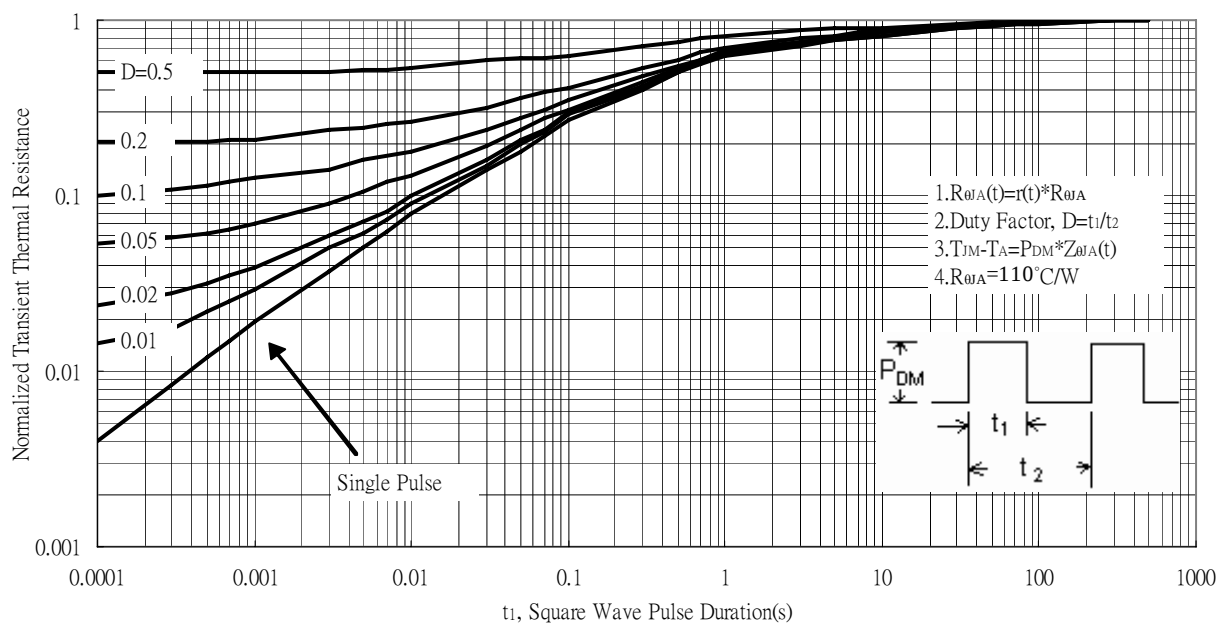


Maximum Drain Current vs Junction Temperature

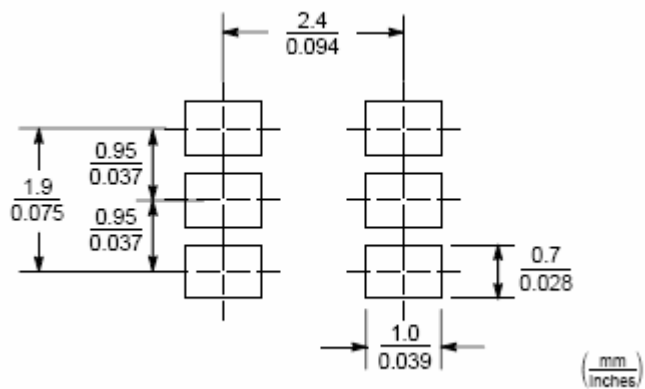


P-channel Typical Characteristics(Cont.)

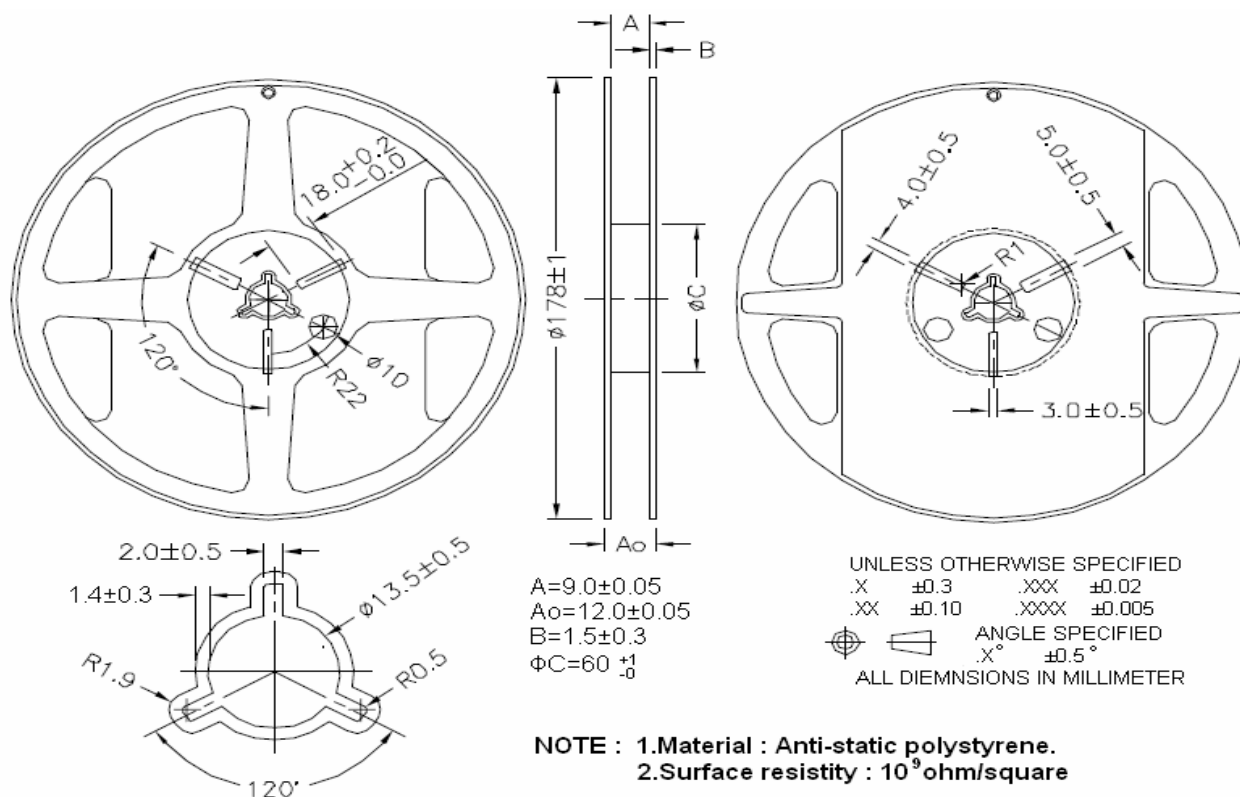
Transient Thermal Response Curves



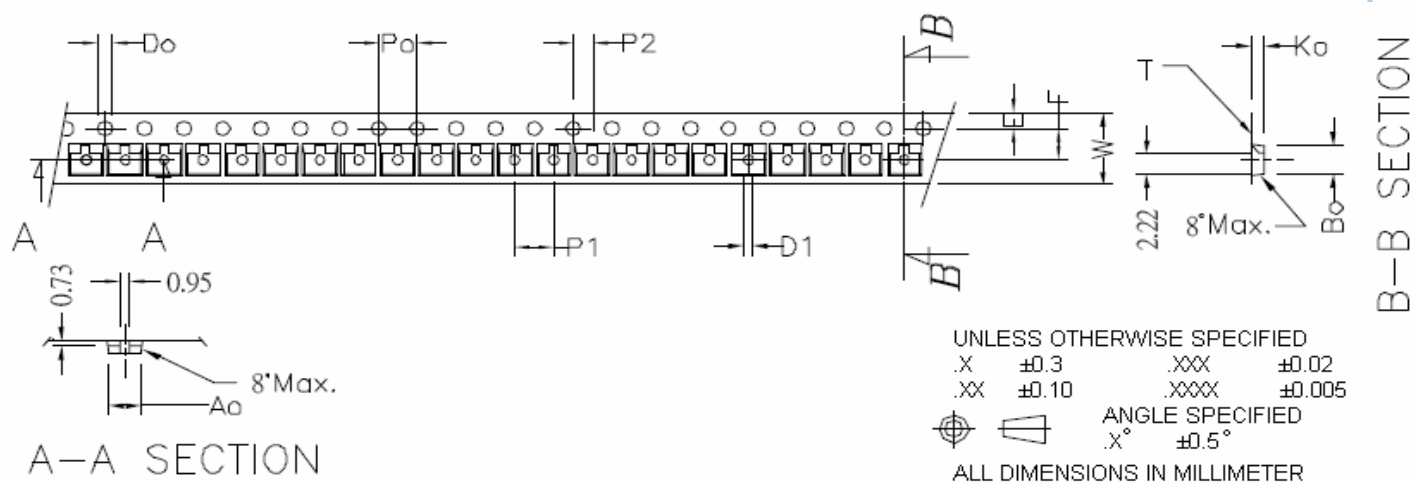
Recommended Soldering Footprint



Reel Dimension



Carrier Tape Dimension

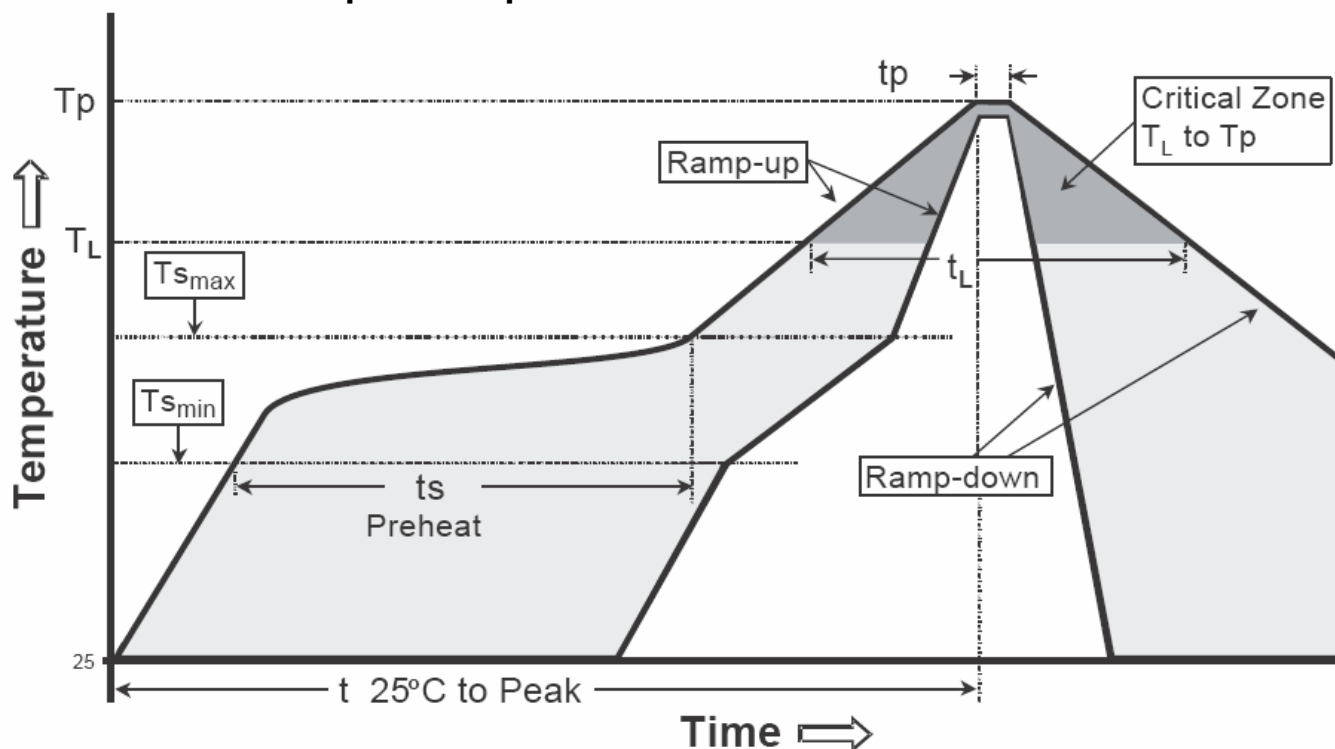


symbol	Ao	Bo	Ko	Po	P1	P2	T
Spec	3.20 ± 0.1	3.00 ± 0.1	1.33 ± 0.1	4.0 ± 0.1	4.0 ± 0.10	2.0 ± 0.05	0.20 ± 0.02
symbol	E	F	Do	D1	W	10Po	
Spec	1.75 ± 0.1	3.5 ± 0.05	1.50 ± 0.10	1.0 ± 0.25	$8.0^{+0.3}_{-0.1}$	40.0 ± 0.2	

Recommended wave soldering condition

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

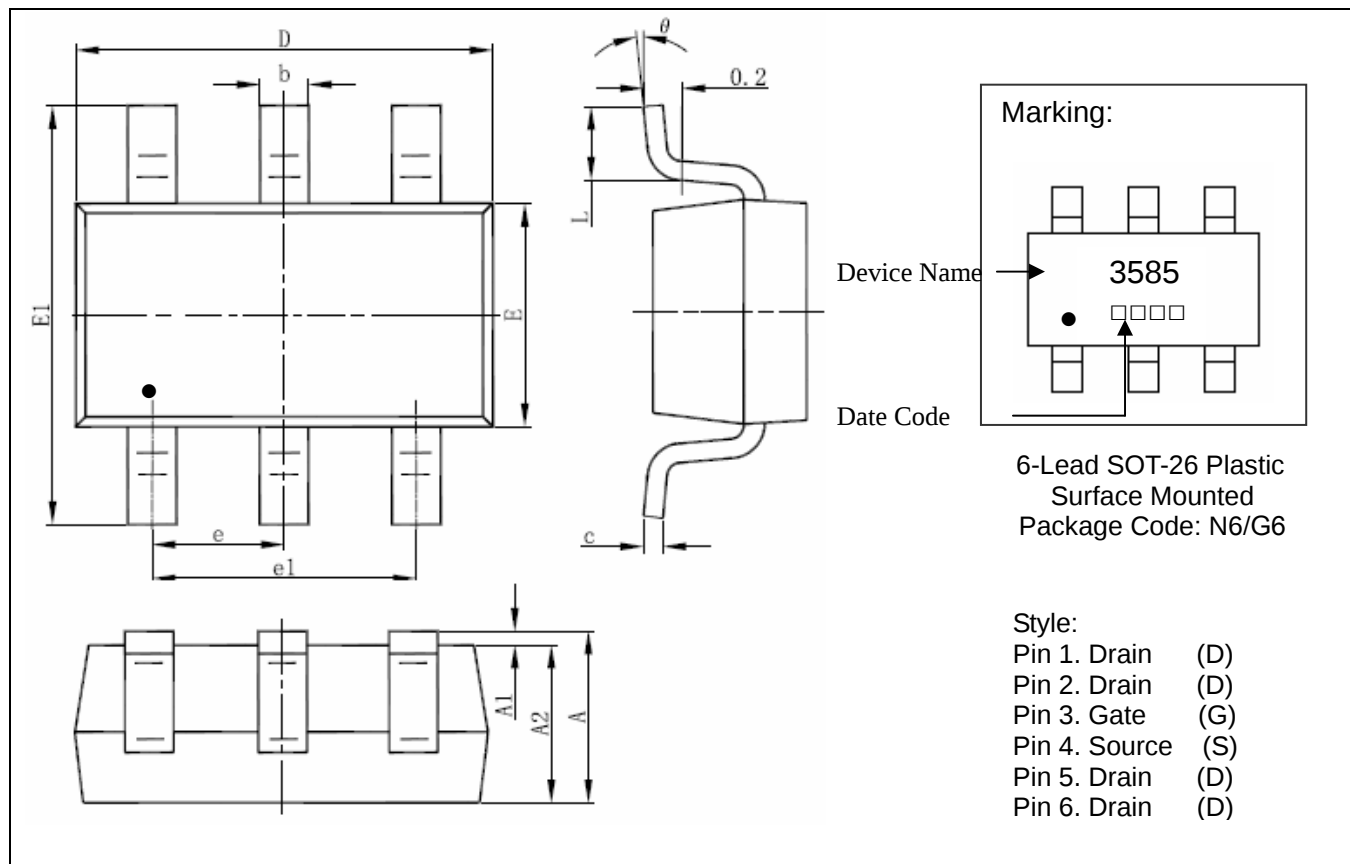
Recommended temperature profile for IR reflow



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_{smin})	100°C	150°C
-Temperature Max(T_{smax})	150°C	200°C
-Time(t_{smin} to t_{smax})	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.

SOT-26 Dimension



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°