N- AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

MTS9539G6

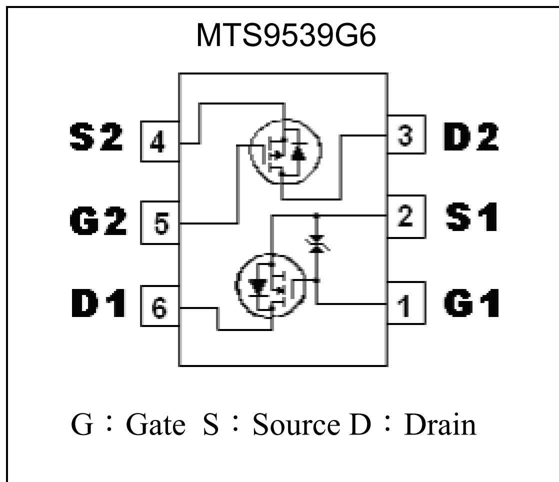
Description

The MTS9539G6 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single TSOP-6 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The TSOP-6 package is universally preferred for all commercial-industrial surface mount applications.

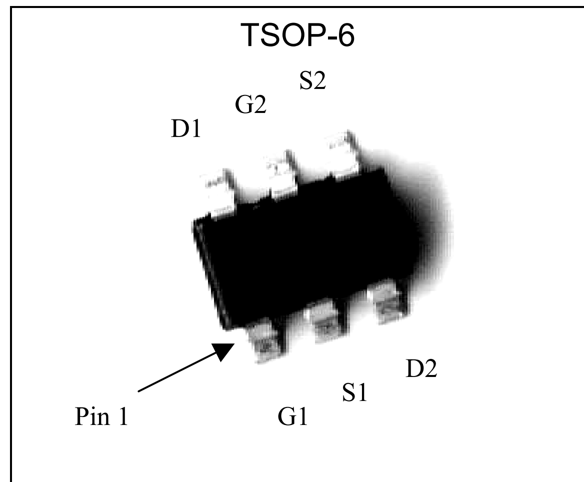
Features

- Simple drive requirement
- Low gate charge
- Low on-resistance
- Fast switching speed
- Pb-free lead plating and halogen-free package
- ESD diode protected gate (Tr 1, N-channel)

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping
MTS9539G6-0-T1-G	TSOP-6 (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}	60	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	
Continuous Drain Current @T_A=25 °C (Note 1)	I_D	0.6	-3.7	A
Continuous Drain Current @T_A=70 °C (Note 1)		0.48	-3.0	
Pulsed Drain Current (Note 2)	I_{DM}	1.8	-30	
Total Power Dissipation (Note 1)	P_D	1.14		W
Linear Derating Factor		0.01		W / °C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,ja	110		°C/W

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec; 180°C/W when mounted on minimum copper pad
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}	60	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	0.8	-	1.5		V_{DS}=3V, I_D=100μA
I_{GSS}	-	-	±10	μA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1		V_{DS}=60V, V_{GS}=0V
	-	-	10		V_{DS}=48V, V_{GS}=0, Tj=70°C
*$R_{DS(ON)}$	-	1.0	2	Ω	I_D=300mA, V_{GS}=10V
	-	1.2	2.5		I_D=100mA, V_{GS}=4V
	-	1.6	3		I_D=10mA, V_{GS}=2.5V
*G_{FS}	100	270	-	mS	V_{DS}=10V, I_D=100mA
Dynamic					
Ciss	-	36	-	pF	V_{DS}=25V, V_{GS}=0V, f=1MHz
Coss	-	14	-		
Crss	-	1.3	-		
*$t_{d(ON)}$	-	6	-	ns	V_{DS}=30V, I_D=100mA, V_{GS}=5V, R_G=25Ω
*t_r	-	15.8	-		
*$t_{d(OFF)}$	-	14.8	-		
*t_f	-	21.4	-		
*Qg	-	1.12	-	nC	V_{DS}=30V, I_D=0.3A, V_{GS}=4.5V
*Qgs	-	0.24	-		
*Qgd	-	0.44	-		
Source-Drain Diode					
*I_S	-	-	0.6	A	
*I_{SM}	-	-	1.8		
*V_{SD}	-	0.79	1.2	V	V_{GS}=0V, I_S=100mA

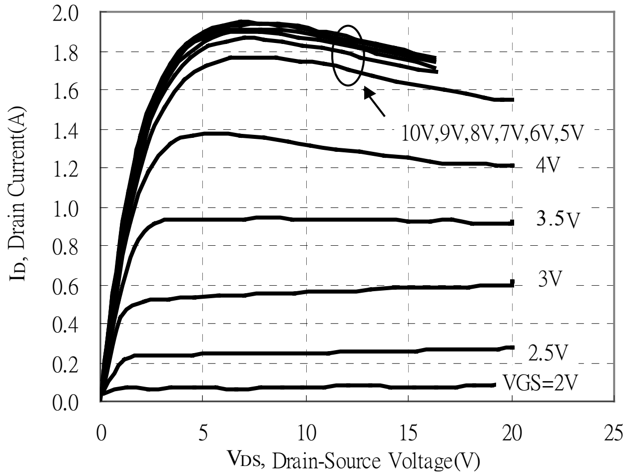
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

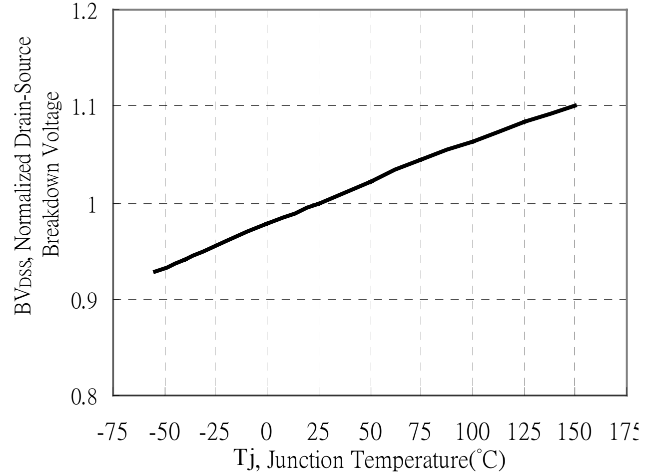
P-Channel Electrical Characteristics (Tj=25°C, unless otherwise specified)

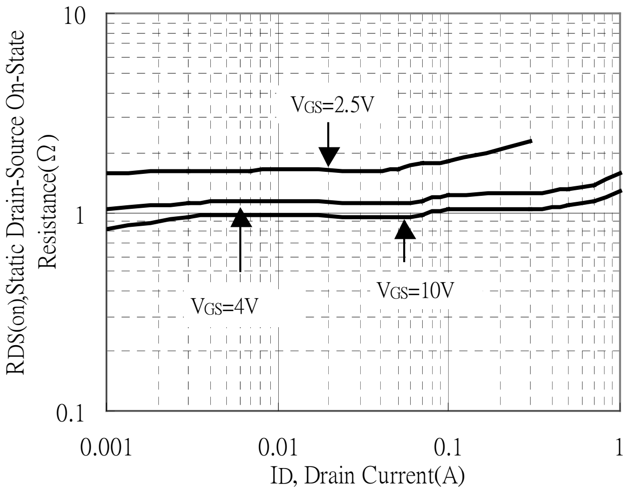
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-1	-	-2.5		V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-24V, V_{GS}=0V
	-	-	-25		V_{DS}=-24V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	43	54	mΩ	I_D=-5A, V_{GS}=-10V
	-	53	69		I_D=-3.7A, V_{GS}=-4.5V
	-	56	73		I_D=-3A, V_{GS}=-4V
*G_{FS}	-	3	-	S	V_{DS}=-10V, I_D=-1A
Dynamic					
Ciss	-	619	-	pF	V_{DS}=-15V, V_{GS}=0V, f=1MHz
Coss	-	76	-		
Crss	-	61	-		
*$t_{d(ON)}$	-	14.2	-	ns	V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V, R_G=6Ω, R_D=10Ω
*t_r	-	21.2	-		
*$t_{d(OFF)}$	-	45.8	-		
*t_f	-	24.2	-		
*Qg	-	6.4	-	nC	V_{DS}=-10V, I_D=-3.7A, V_{GS}=-4.5V
*Qgs	-	1.9	-		
*Qgd	-	1.8	-		
Source-Drain Diode					
*I_S	-	-	-1	A	
*I_{SM}	-	-	-4		
*V_{SD}	-	-0.77	-1.2	V	V_{GS}=0V, I_S=-1A

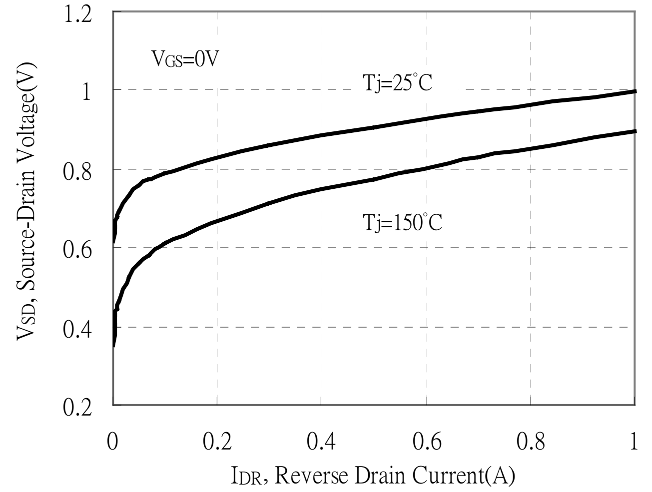
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

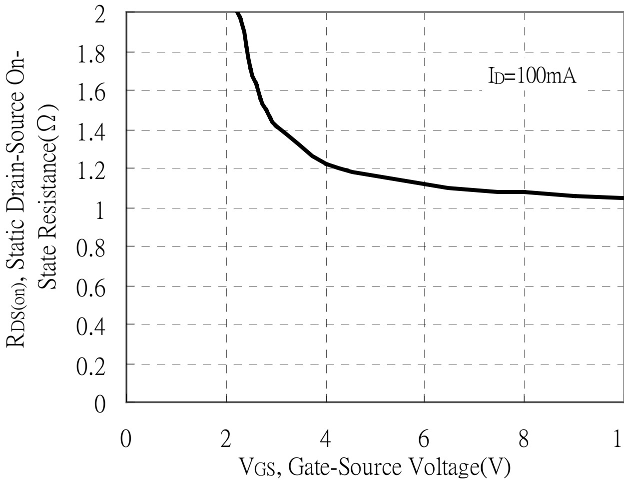
N-channel Characteristic Curves

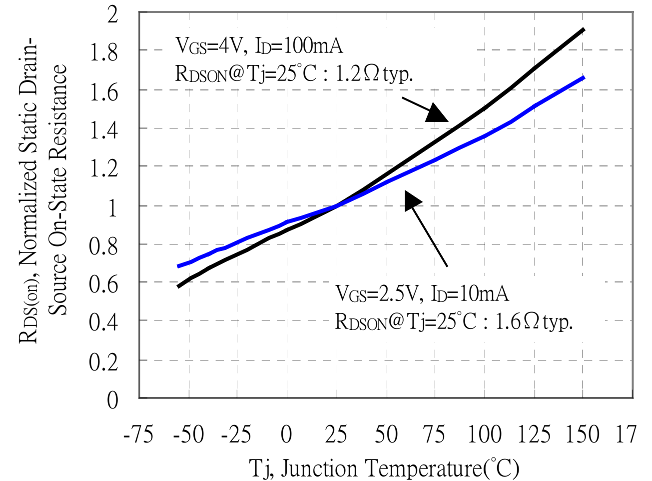












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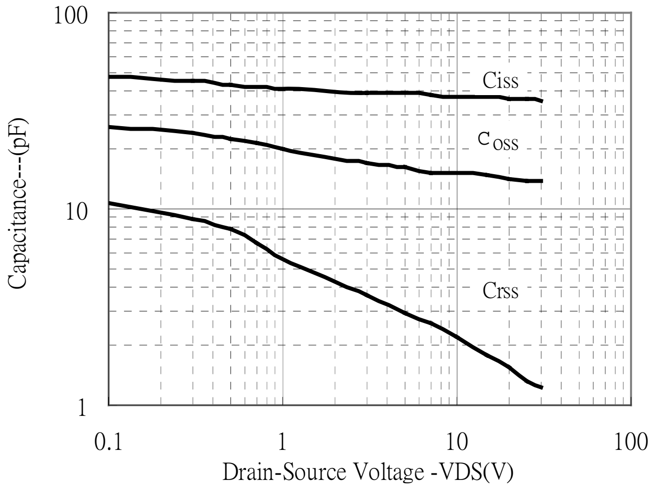

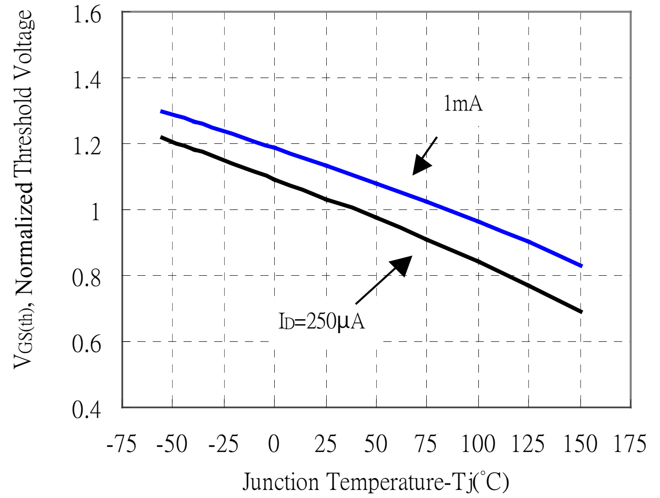

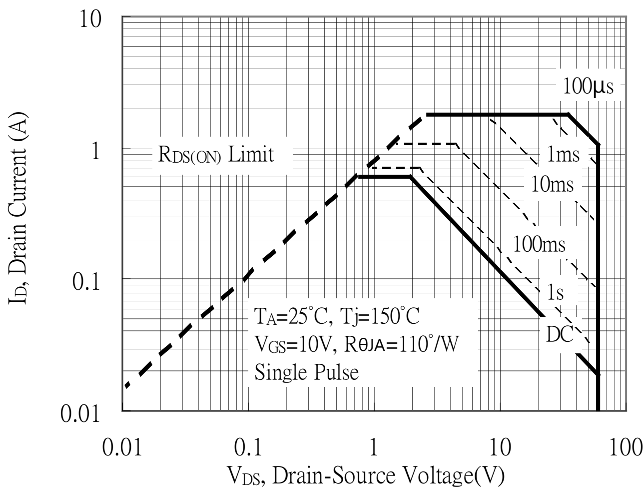

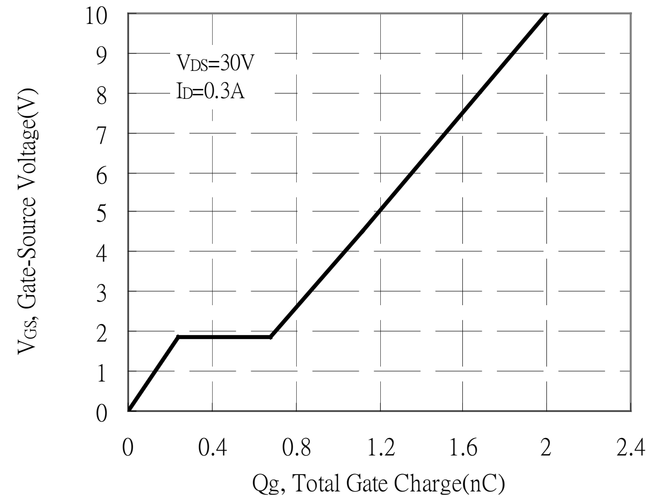

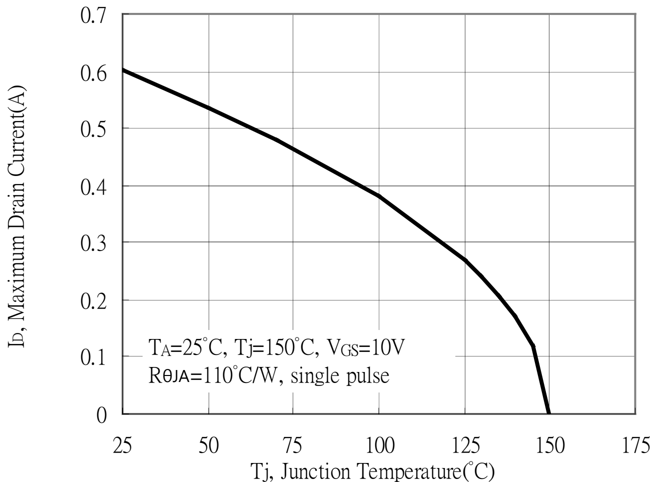

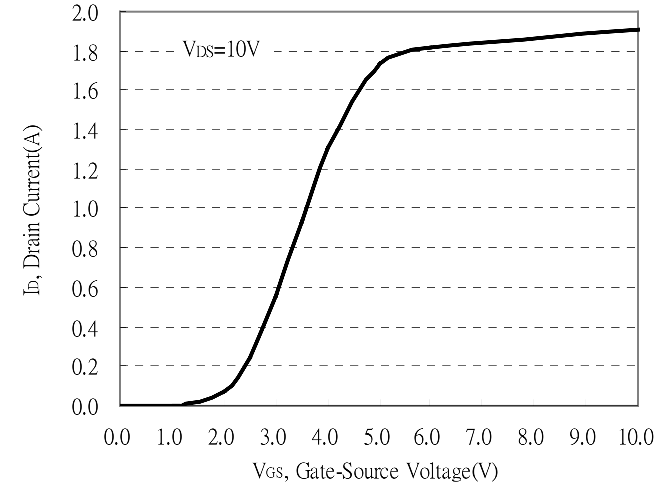

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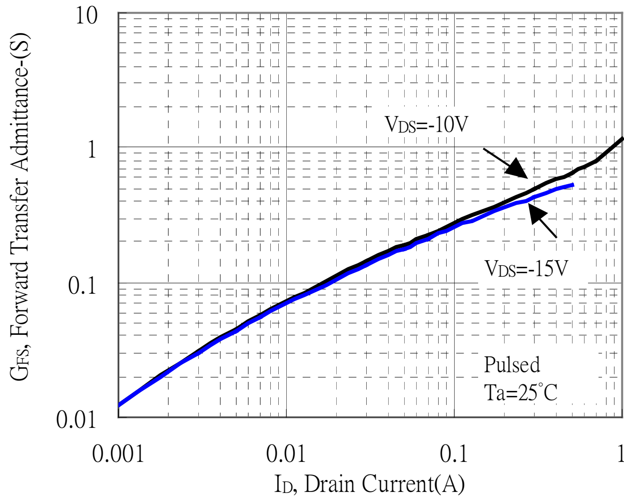
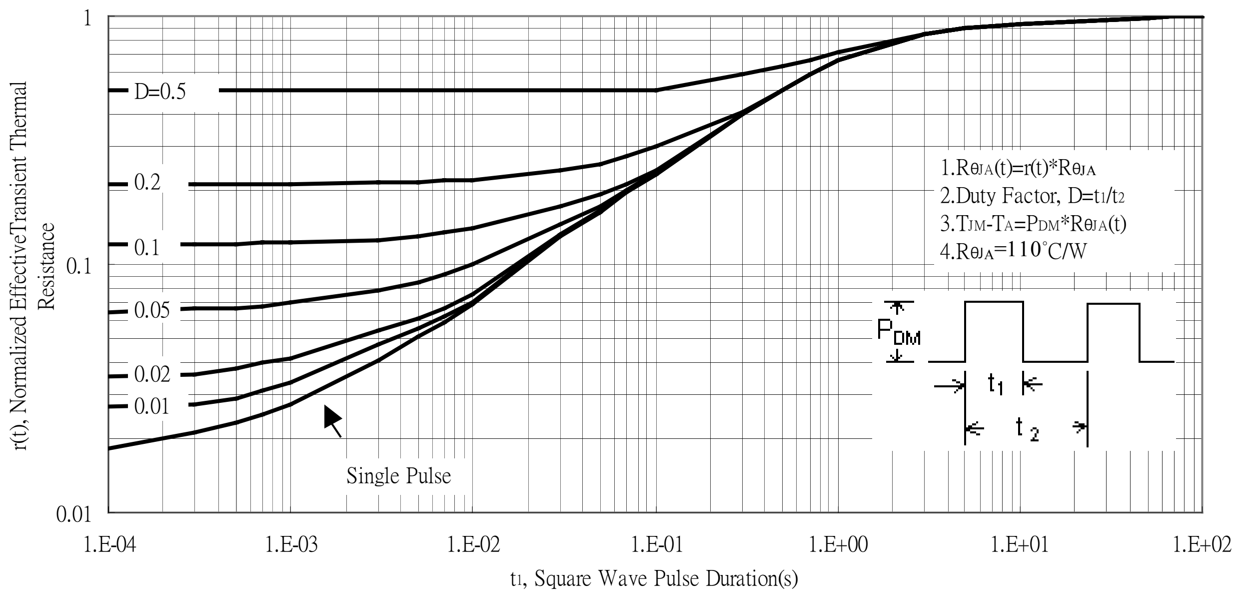
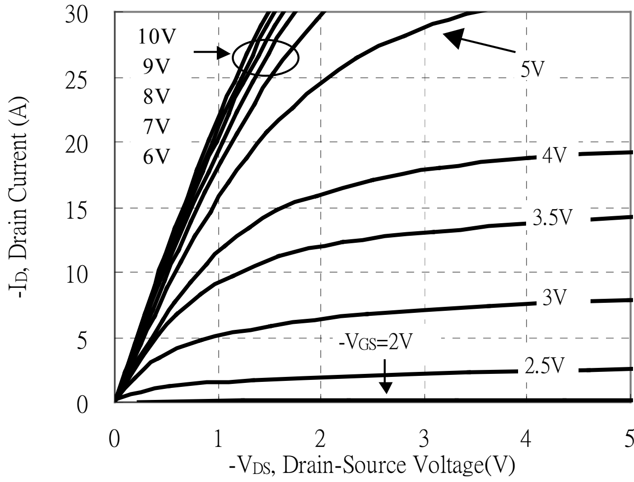
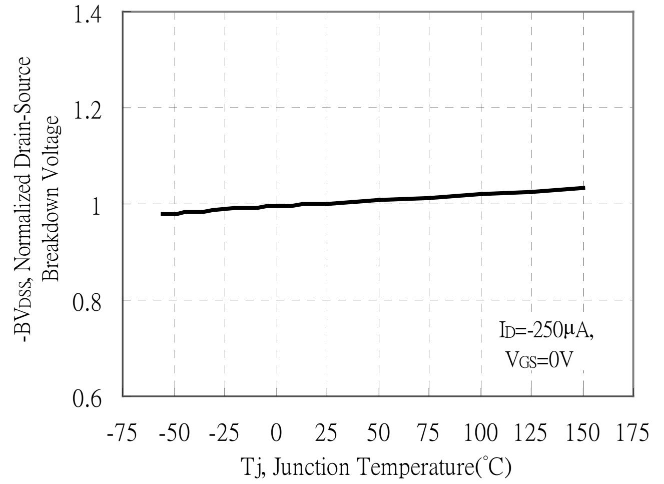
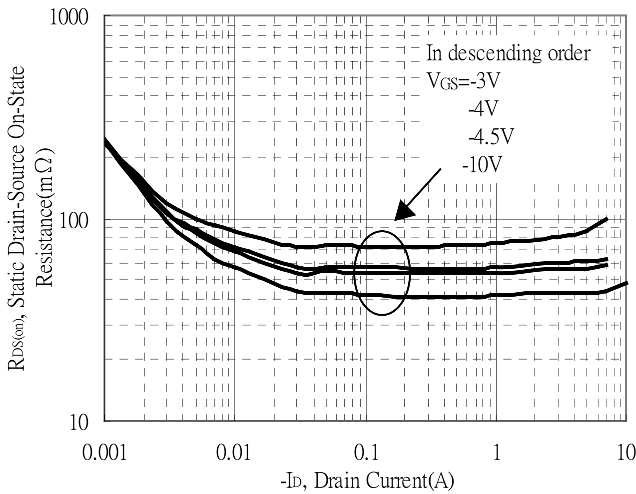


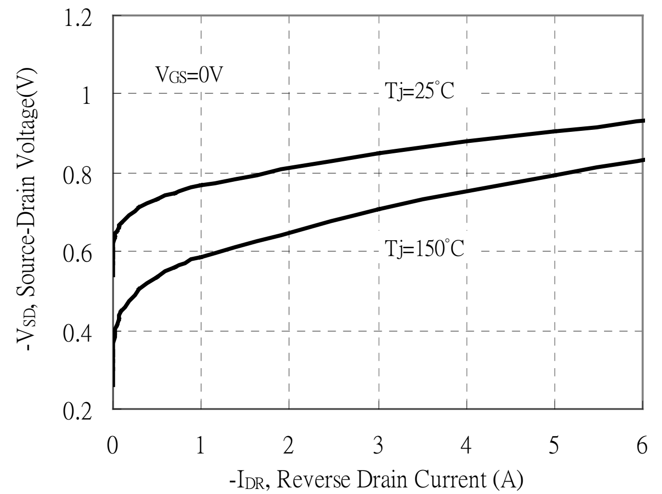


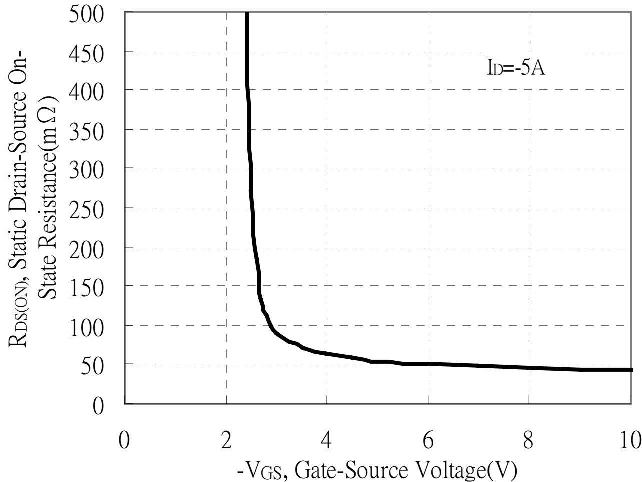
P-channel Characteristic Curves

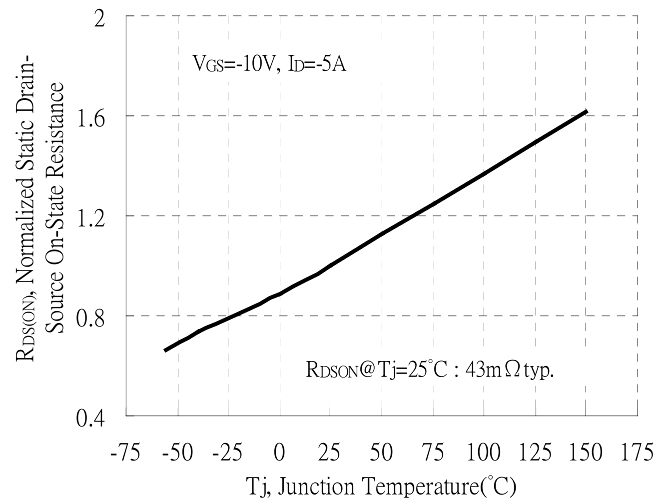












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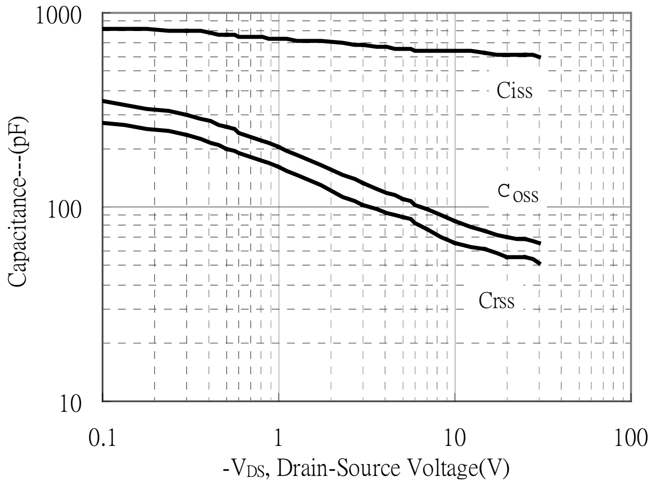
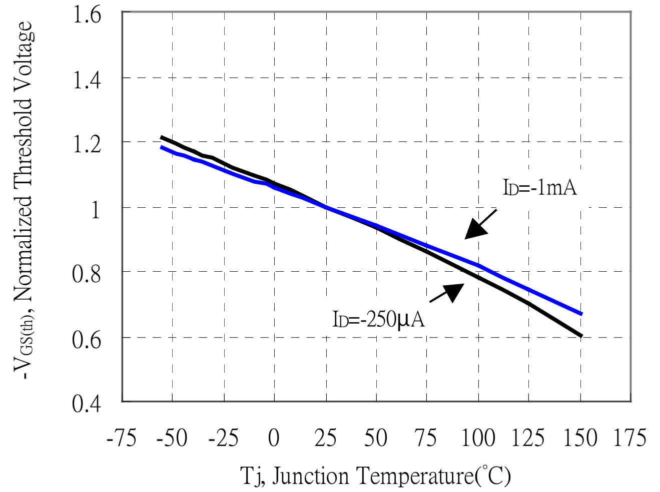
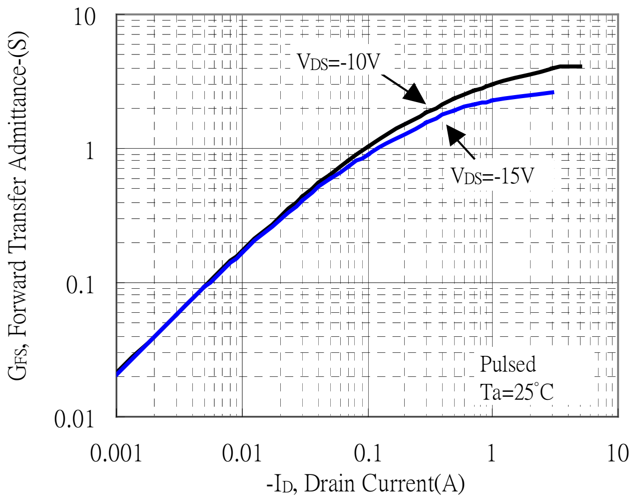
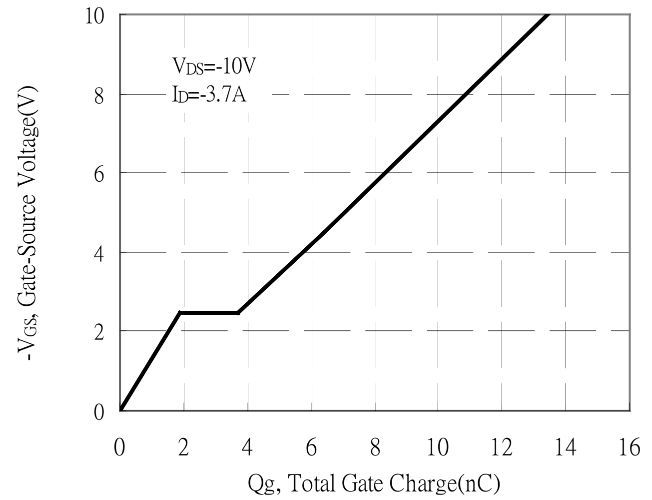
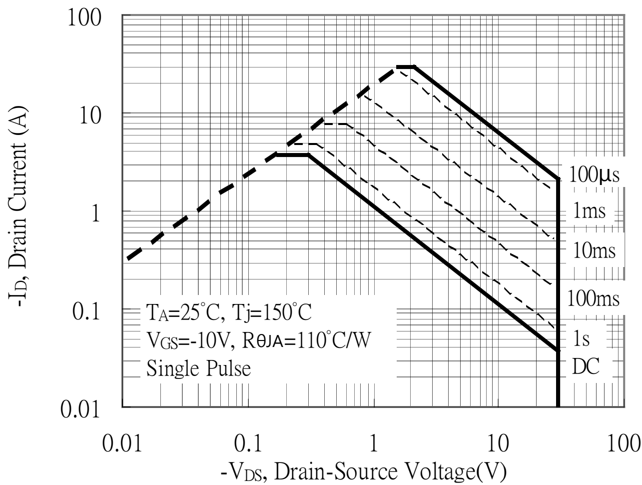
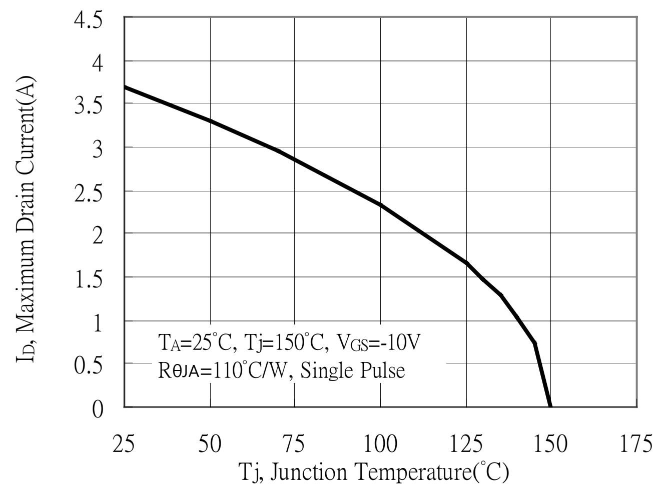




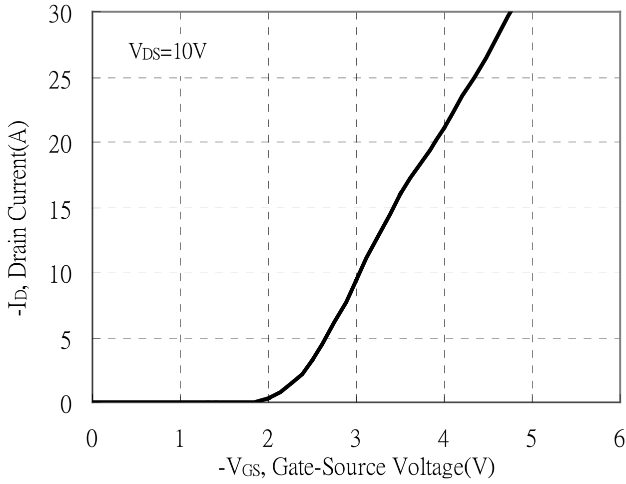


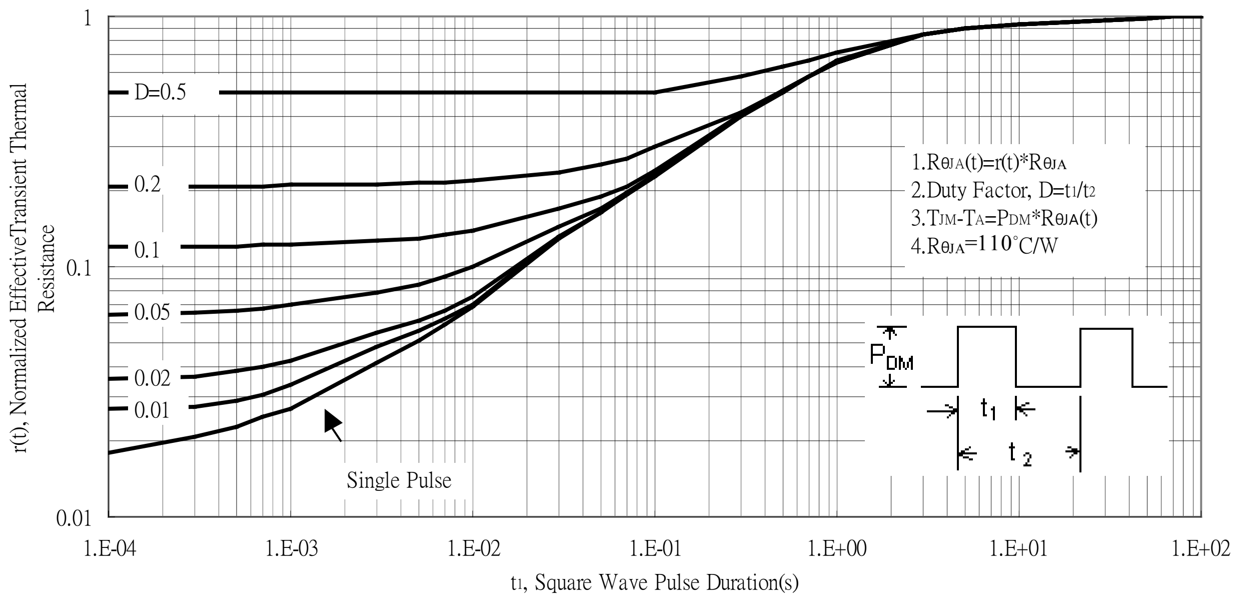




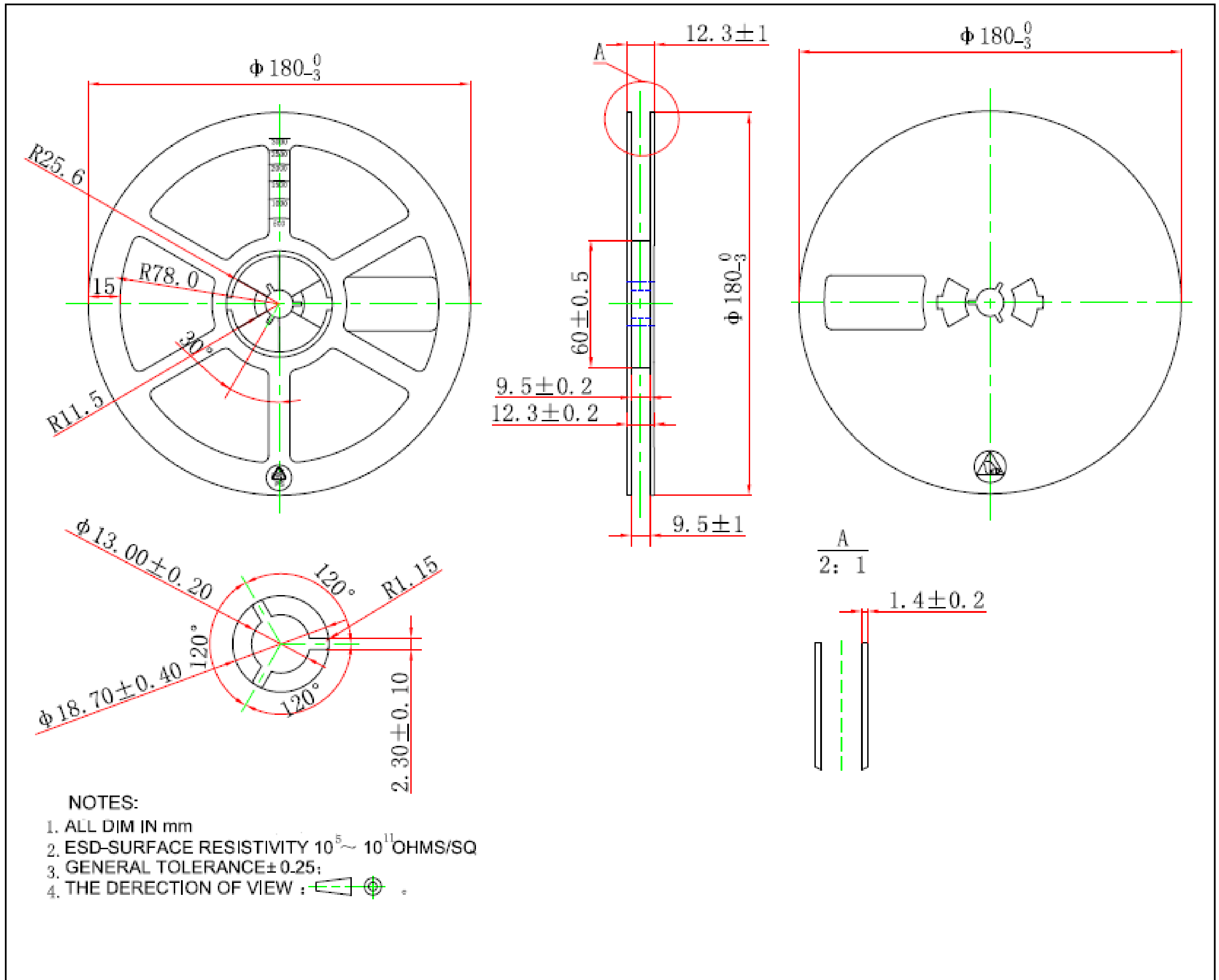


P-channel Characteristic Curves(Cont.)

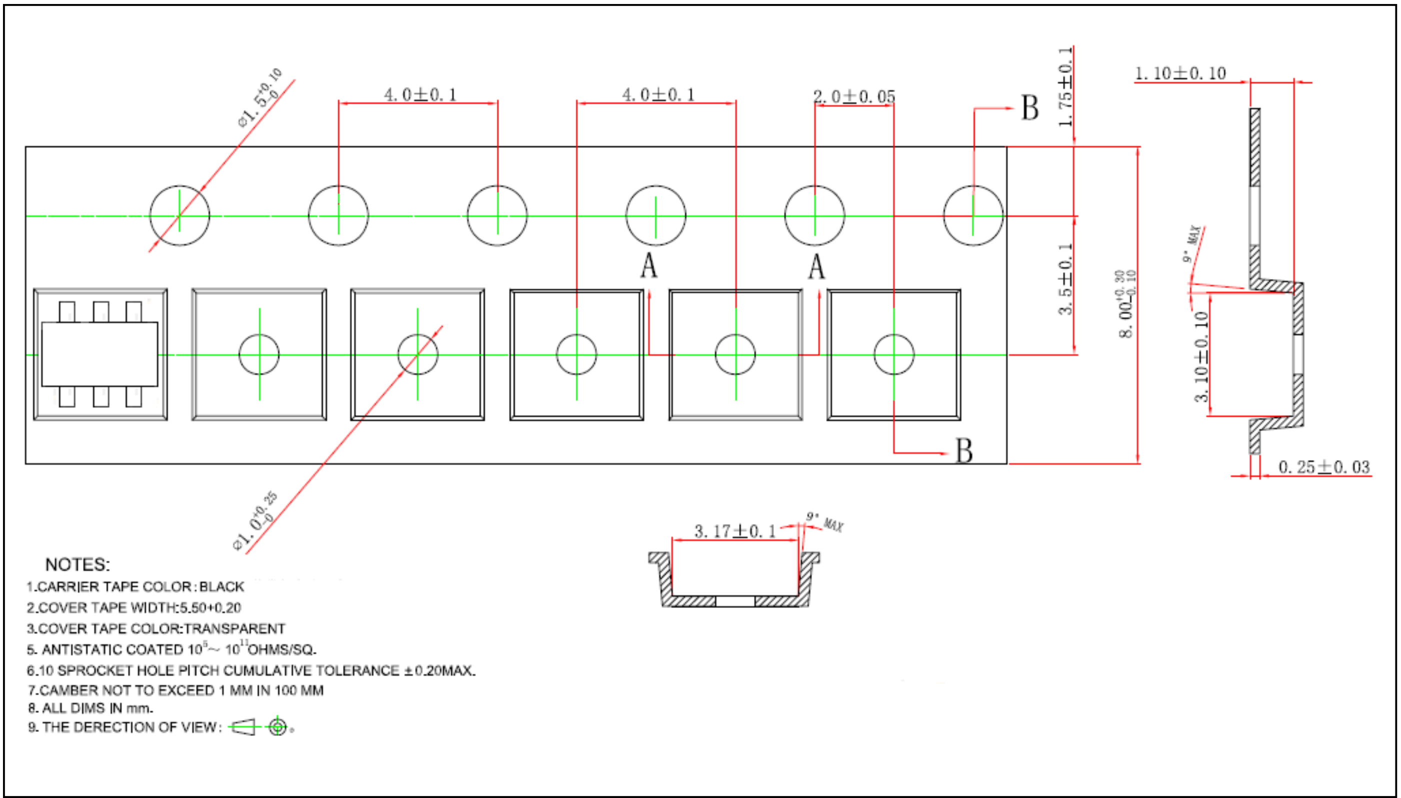




Reel Dimension



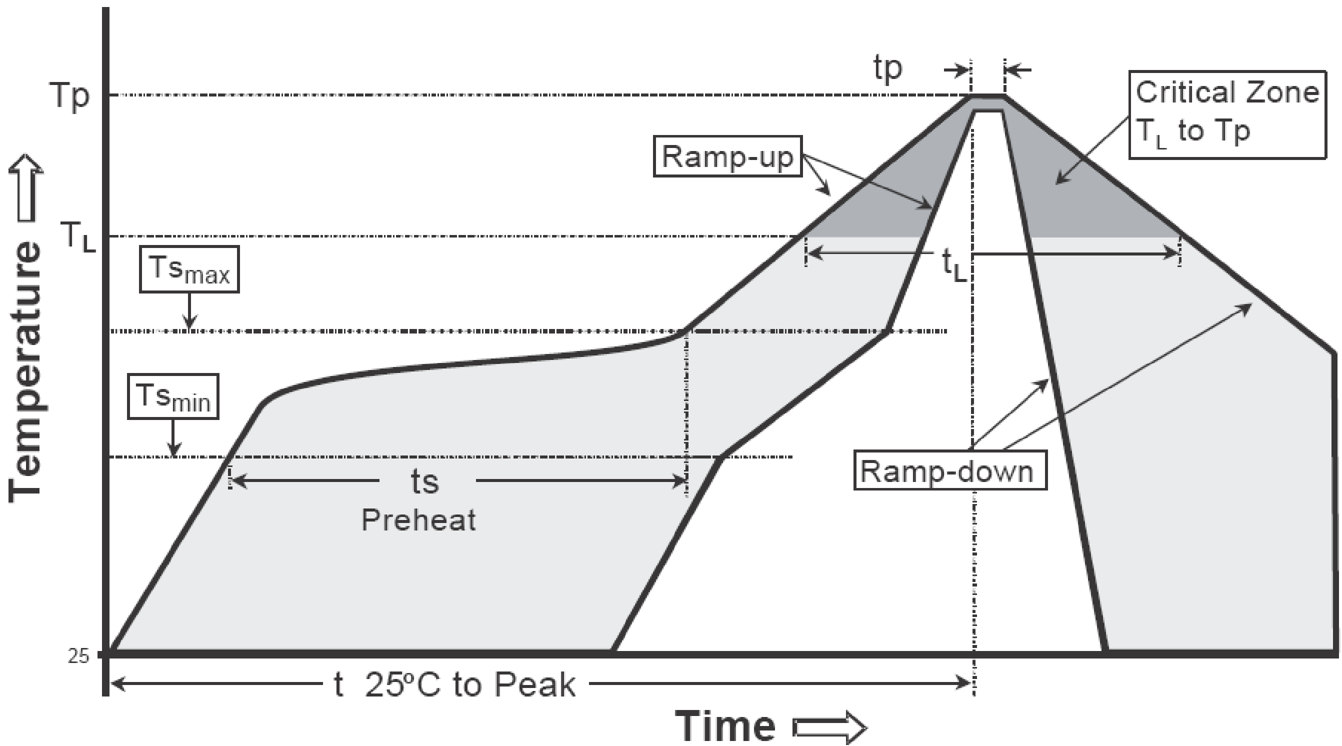
Carrier Tape Dimension



Recommended wave soldering condition

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

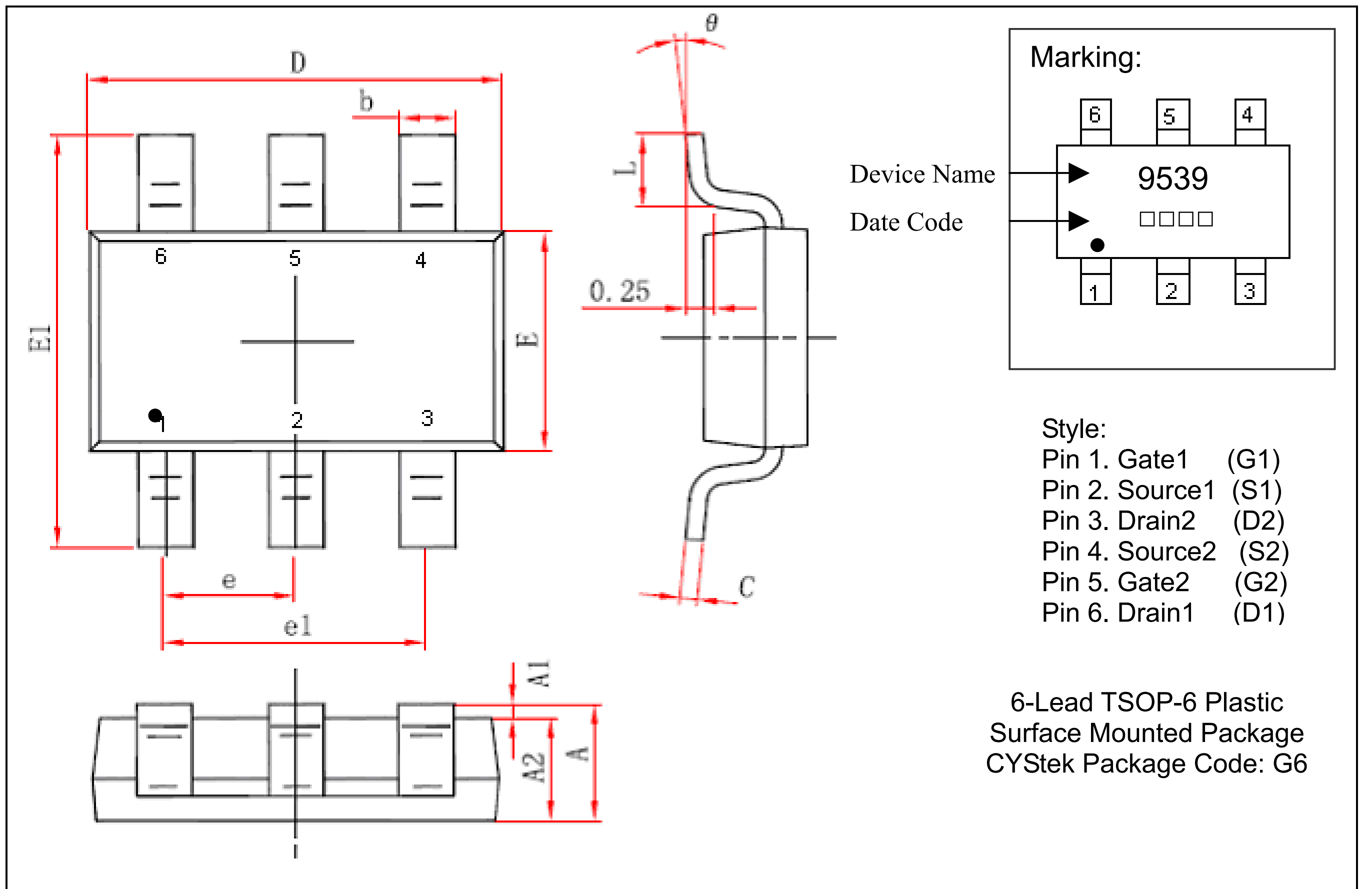
Recommended temperature profile for IR reflow



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(ts_{min} to ts_{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.

TSOP-6 Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035	E	1.600	1.700	0.063	0.067
A1	0.000	0.100	0.000	0.004	E1	2.650	2.950	0.104	0.116
A2	0.700	0.800	0.028	0.031	e	0.95 (BSC)		0.037 (BSC)	
b	0.350	0.500	0.014	0.020	e1	1.90 (BSC)		0.075 (BSC)	
c	0.080	0.200	0.003	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°

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.

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