

N and P-Channel Enhancement Mode Power MOSFET

Description

The HM6602 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a Battery protection or in other Switching application.

General Features

● N-Channel

$$V_{DS} = 30V, I_D = 3.6A$$

$$R_{DS(ON)} < 73m\Omega @ V_{GS}=4.5V$$

$$R_{DS(ON)} < 58m\Omega @ V_{GS}=10V$$

● P-Channel

$$V_{DS} = -30V, I_D = -2.5A$$

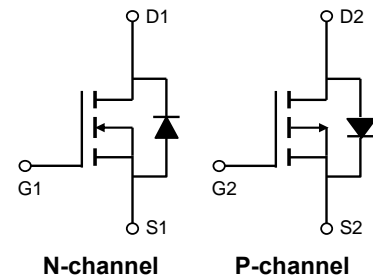
$$R_{DS(ON)} < 130m\Omega @ V_{GS}=-10V$$

$$R_{DS(ON)} < 180m\Omega @ V_{GS}=-4.5V$$

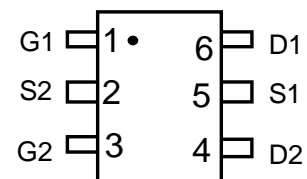
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

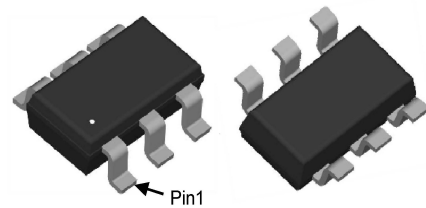
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin Assignment



SOT-23-6 L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM6602	HM6602	SOT-23-6L	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current	I_D	3.6	-2.5	A
Pulsed Drain Current (Note 1)	I_{DM}	30	-30	A
Maximum Power Dissipation	P_D	1.4	1.2	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note2)	$R_{\theta JA}$	N-Ch	1.0	$^{\circ}\text{C/W}$
		P-Ch	104	

N-CH Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	30	33	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V,V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	1.2	1.5	2.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =3.1A	-	58	73	mΩ
		V _{GS} =10V, I _D =3.6A	-	40	58	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =2.9A	10	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =15V,V _{GS} =0V, F=1.0MHz	-	623	-	PF
Output Capacitance	C _{oss}		-	99	-	PF
Reverse Transfer Capacitance	C _{rss}		-	77	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V,I _D =2.9A V _{GS} =10V,R _{GEN} =3Ω	-	3.3	-	nS
Turn-on Rise Time	t _r		-	4.8	-	nS
Turn-Off Delay Time	t _{d(off)}		-	26	-	nS
Turn-Off Fall Time	t _f		-	4	-	nS
Total Gate Charge	Q _g	V _{DS} =15V,I _D =3.6A, V _{GS} =4.5V	-	9.5	-	nC
Gate-Source Charge	Q _{gs}		-	1.5	-	nC
Gate-Drain Charge	Q _{gd}		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =2.9A	-	0.75	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	2.9	A

P-CH Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-30		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-24V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1	-1.6	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-2.5A	-	72	130	mΩ
		V _{GS} =-4.5V, I _D =-1.5A	-	110	180	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-2.5A	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, F=1.0MHz	-	950	-	PF
Output Capacitance	C _{oss}		-	115	-	PF
Reverse Transfer Capacitance	C _{rss}		-	75	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V, I _D =-3.2A V _{GS} =-10V, R _{GEN} =6Ω	-	7	-	nS
Turn-on Rise Time	t _r		-	3	-	nS
Turn-Off Delay Time	t _{d(off)}		-	30	-	nS
Turn-Off Fall Time	t _f		-	12	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V, I _D =-4A, V _{GS} =-4.5V	-	9.5	-	nC
Gate-Source Charge	Q _{gs}		-	2	-	nC
Gate-Drain Charge	Q _{gd}		-	3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-1A	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

N- Channel Typical Electrical and Thermal Characteristics (Curves)

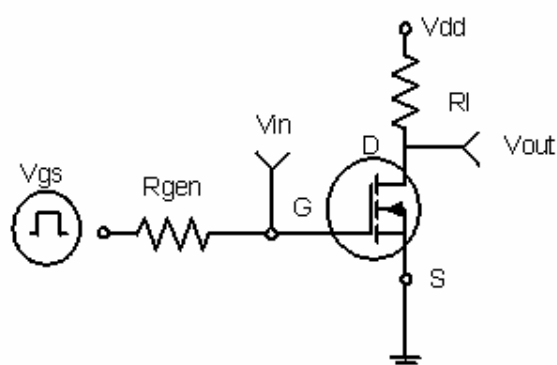


Figure 1: Switching Test Circuit

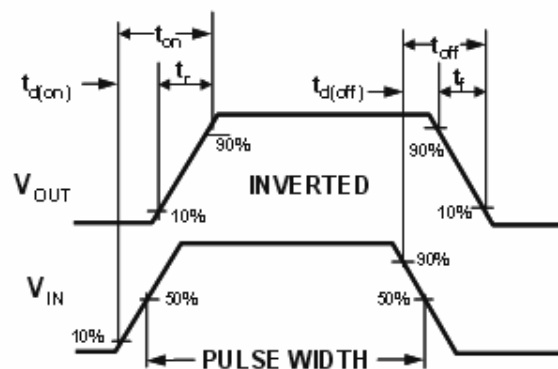


Figure 2: Switching Waveforms

P-Channel Typical Electrical and Thermal Characteristics

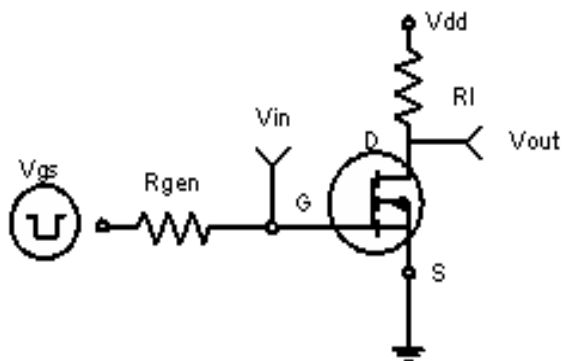


Figure 1: Switching Test Circuit

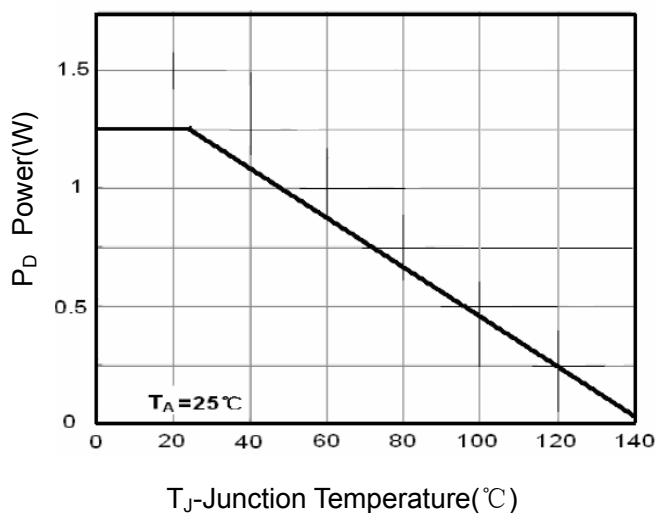


Figure 3 Power Dissipation

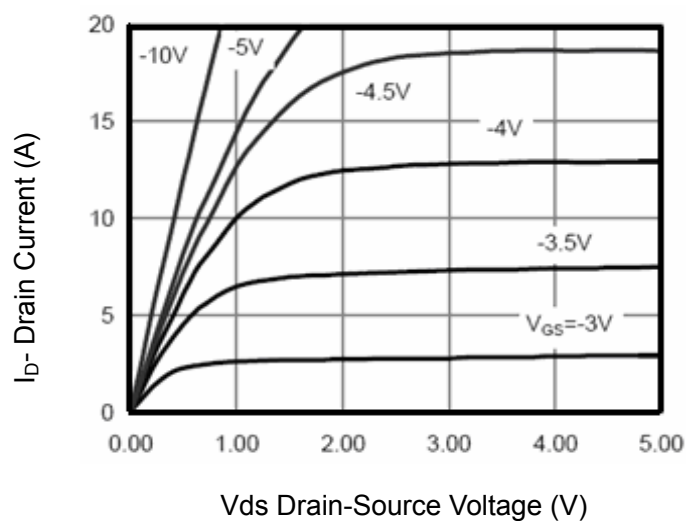


Figure 5 Output CHARACTERISTICS

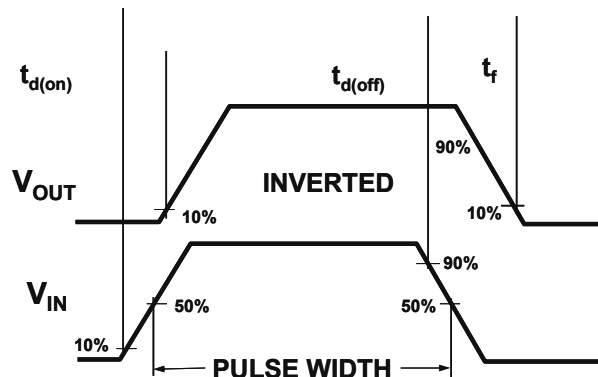


Figure 2: Switching Waveforms

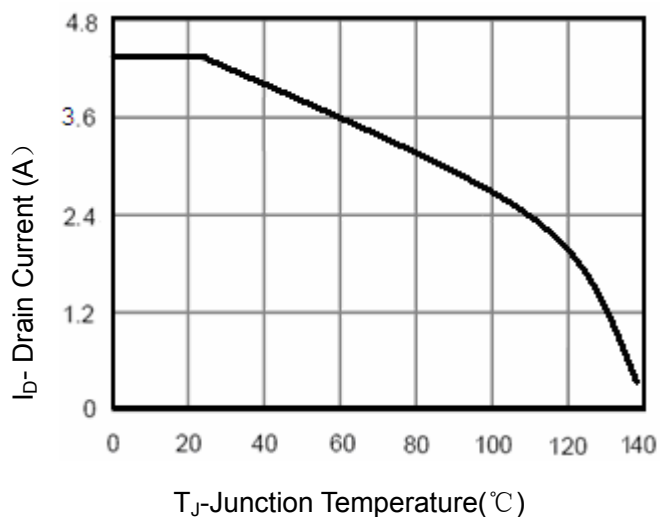


Figure 4 Drain Current

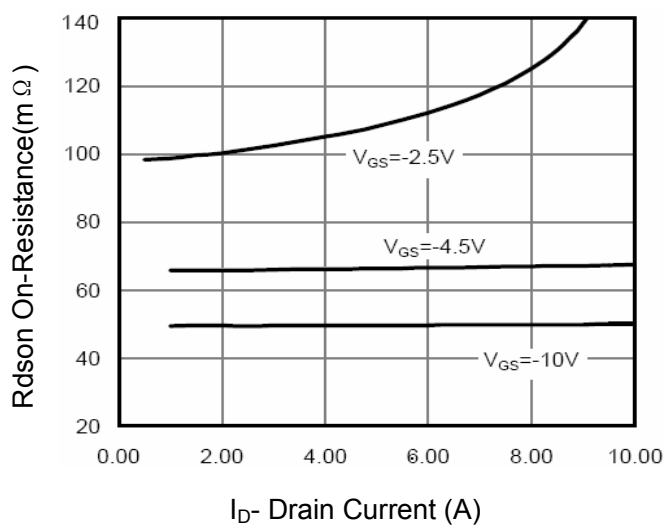


Figure 6 Drain-Source On-Resistance

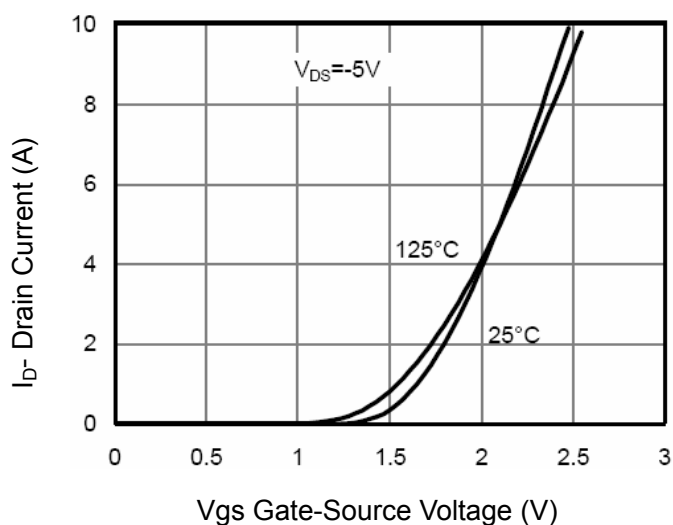


Figure 7 Transfer Characteristics

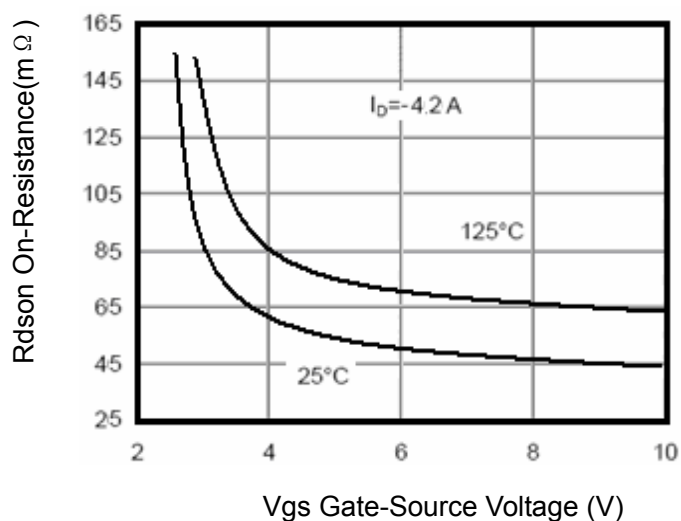


Figure 9 Rdson vs Vgs

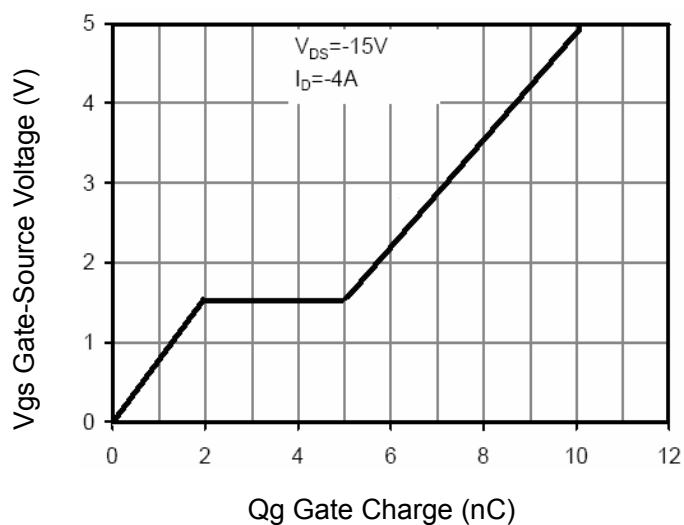


Figure 11 Gate Charge

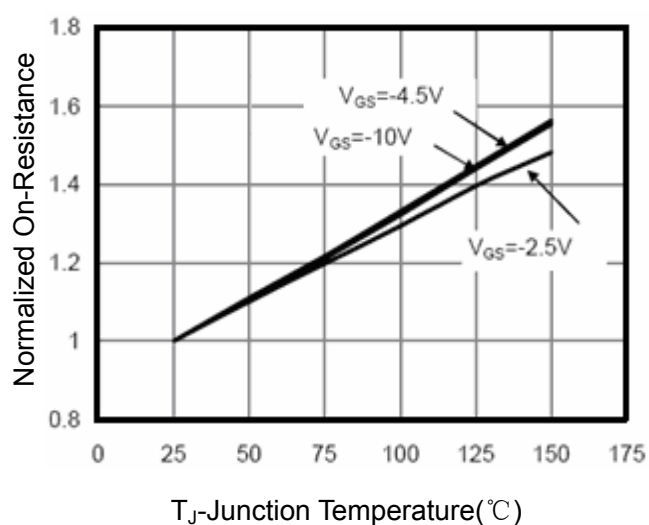


Figure 8 Drain-Source On-Resistance

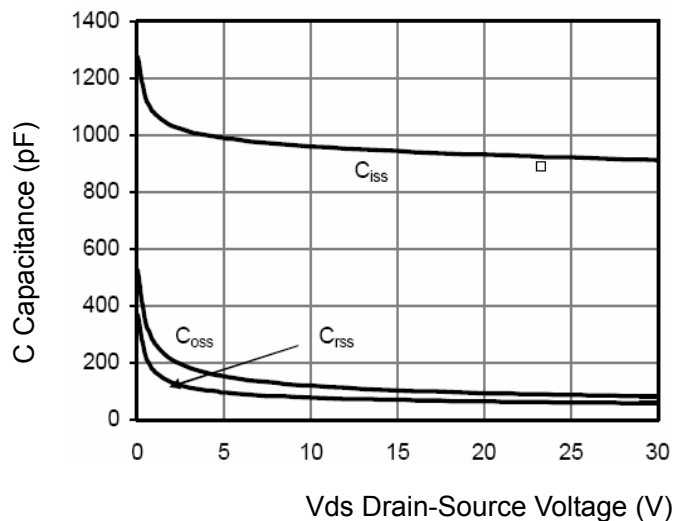


Figure 10 Capacitance vs Vds

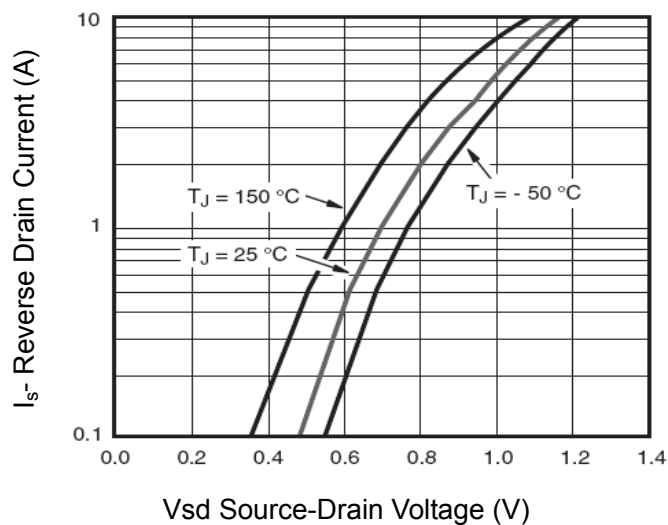
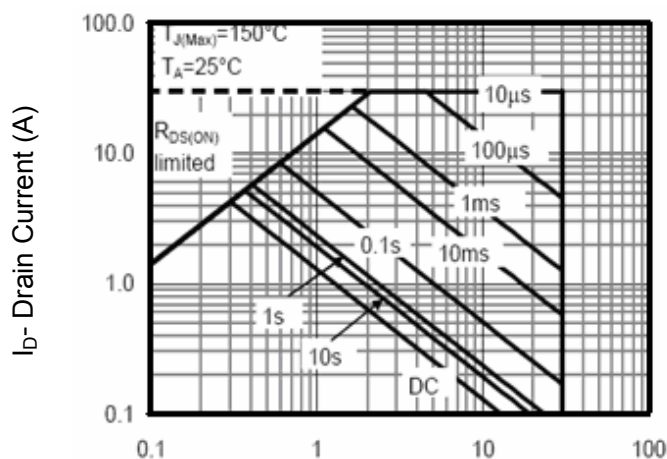
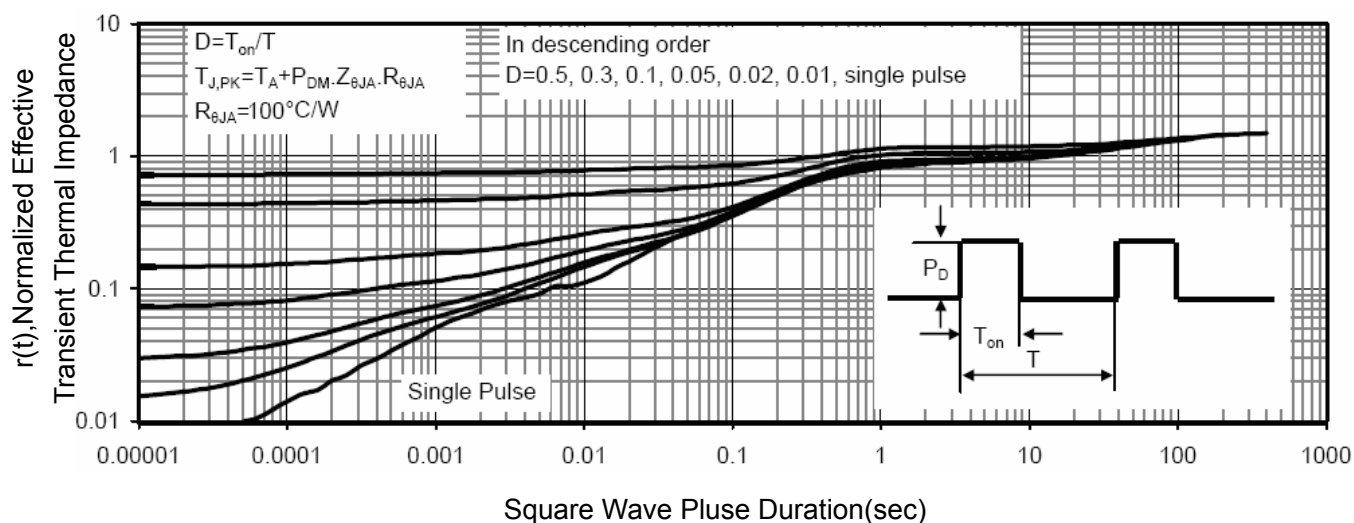


Figure 12 Source- Drain Diode Forward



V_{DS} Drain-Source Voltage (V)

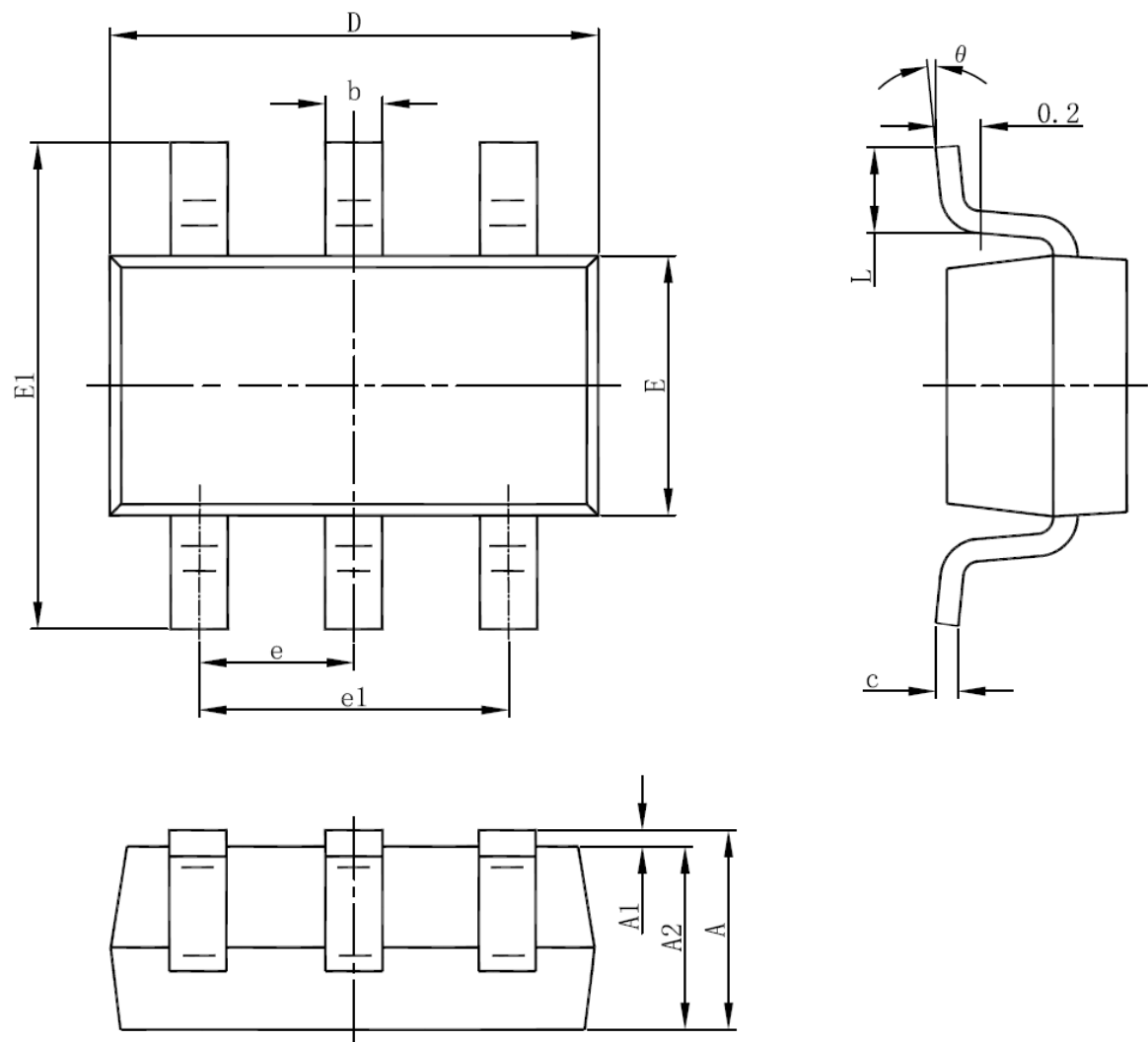
Figure 13 Safe Operation Area



Square Wave Pluse Duration(sec)

Figure 14 Normalized Maximum Transient Thermal Impedance

SOT23-6L PACKAGE INFORMATION



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

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