

## N-Channel Enhancement Mode Power MOSFET

### Description

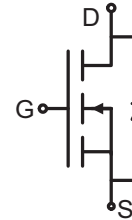
The RM3010S6 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

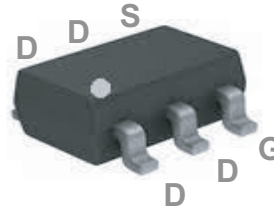
- $V_{DS} = 30V, I_D = 10A$   
 $R_{DS(ON)} < 12m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 16m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low  $R_{dson}$
- Fully characterized Avalanche voltage and current

### Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply
- Halogen-free



Schematic diagram



SOT-23-6 top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3010	RM3010S6	SOT-23-6	Ø180mm	8 mm	3000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	10	A
Drain Current-Continuous ( $T_C = 100^\circ C$ )	$I_D (100^\circ C)$	6	A
Pulsed Drain Current	$I_{DM}$	50	A
Maximum Power Dissipation	$P_D$	2.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	50	$^\circ C/W$
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## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

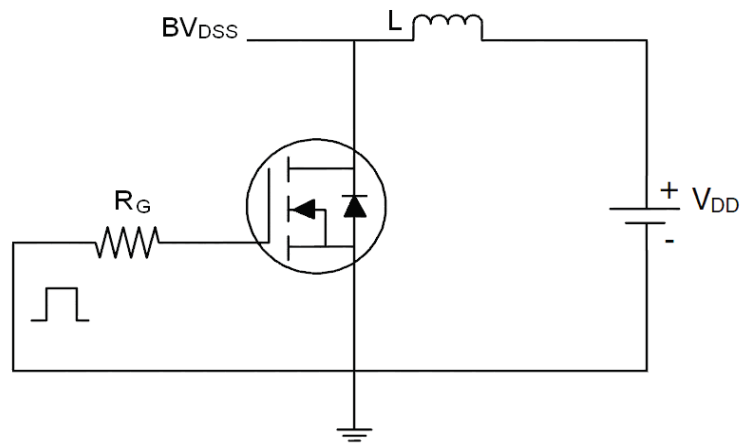
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.6	3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	-	8	12	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	11	16	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=10A$	15	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	1550	-	PF
Output Capacitance	$C_{oss}$		-	300	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	180	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=25V, I_D=1A$ $V_{GS}=10V, R_{GEN}=6\Omega$	-	30	-	nS
Turn-on Rise Time	$t_r$		-	20	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	100	-	nS
Turn-Off Fall Time	$t_f$		-	80	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=10A,$ $V_{GS}=5V$	-	13	-	nC
Gate-Source Charge	$Q_{gs}$		-	5.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	3.5	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=10A$	-	-	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	$I_S$		-	-	10	A

### Notes:

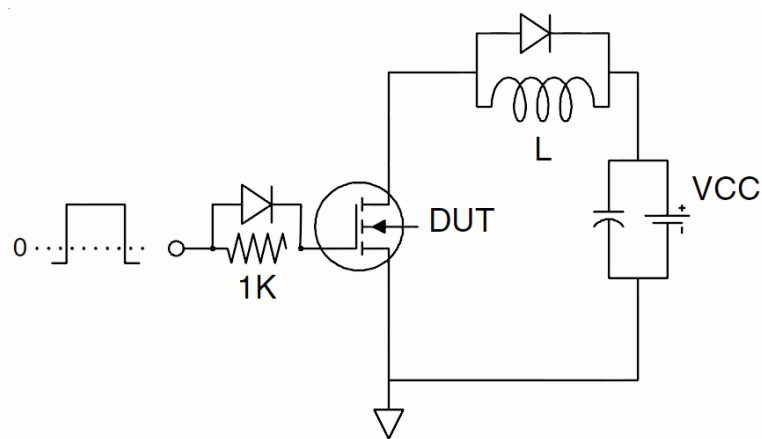
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

# Test Circuit

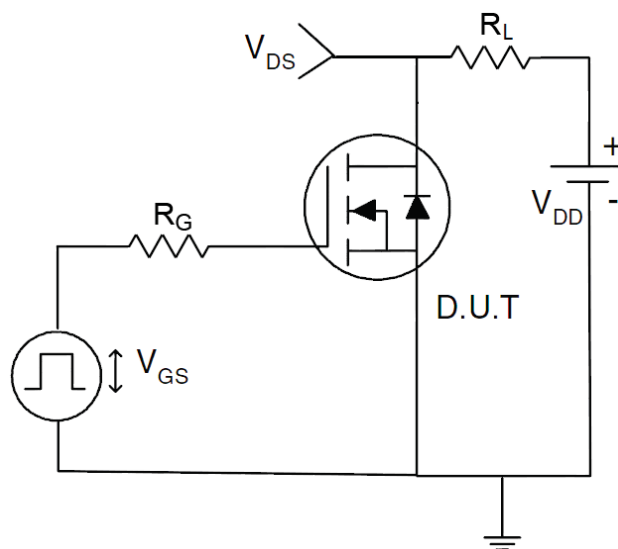
## 1) $E_{AS}$ Test Circuits



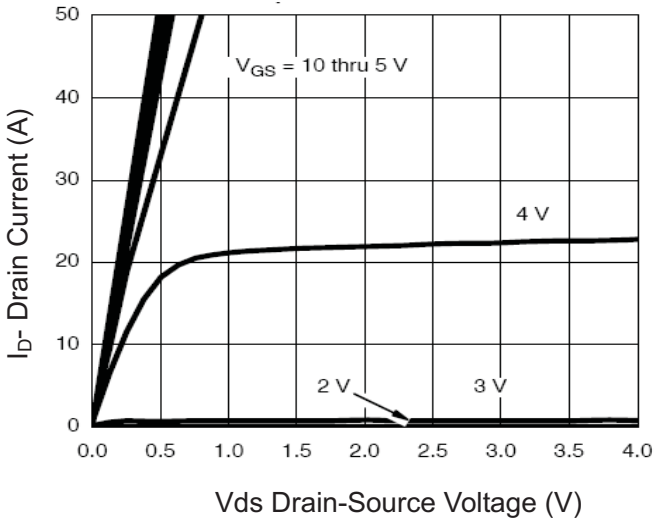
## 2) Gate Charge Test Circuit:



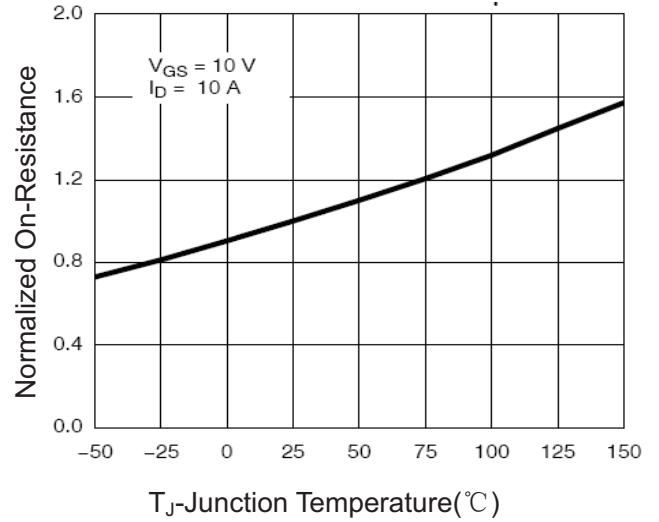
## 3) Switch Time Test Circuit:



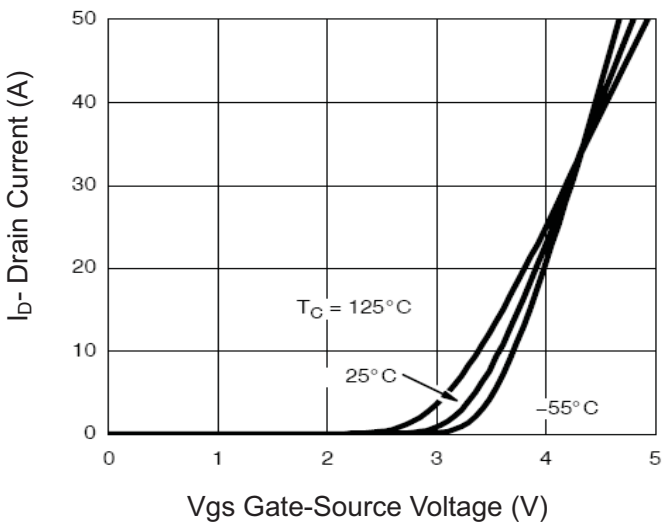
## RATING AND CHARACTERISTICS CURVES (RM3010S6)



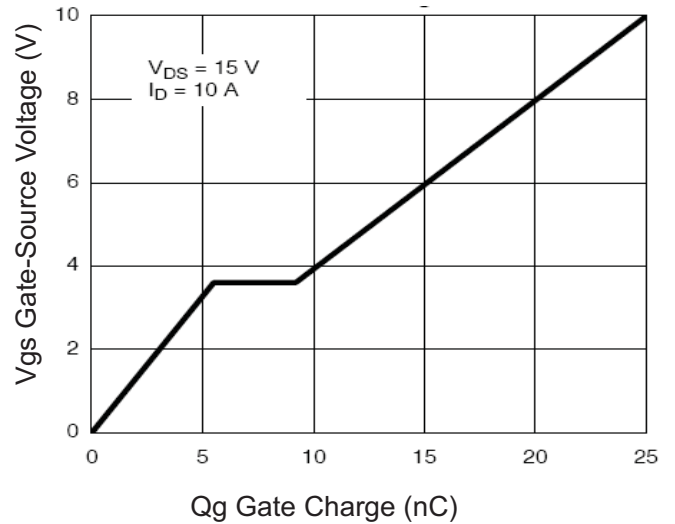
**Figure 1 Output Characteristics**



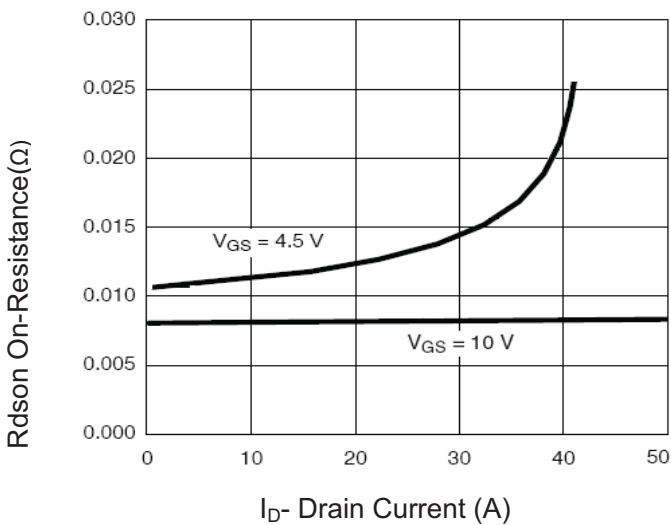
**Figure 4  $R_{Dson}$ -Junction Temperature**



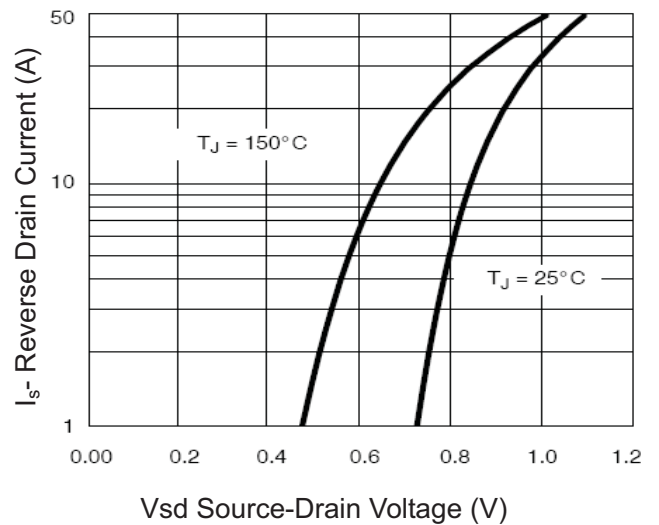
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**

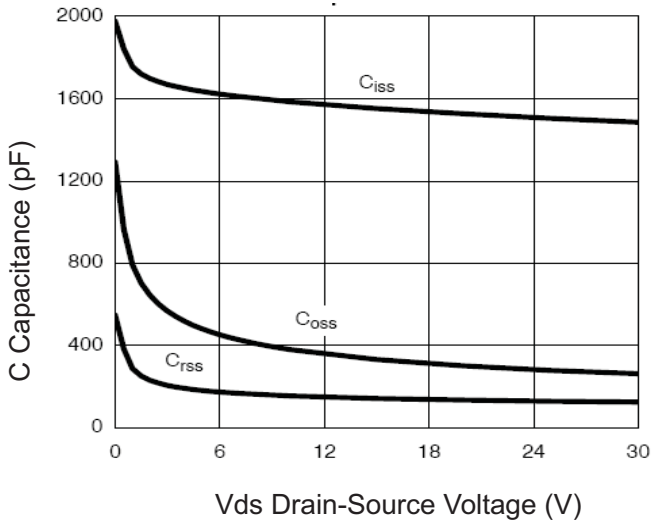


**Figure 3  $R_{Dson}$ - Drain Current**

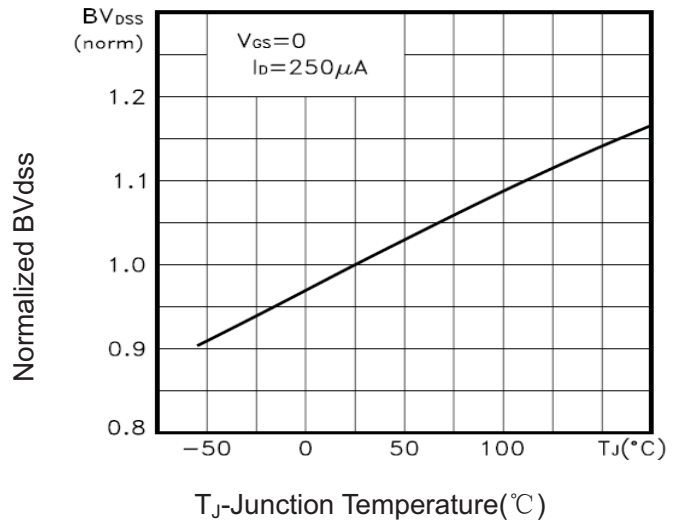


**Figure 6 Source- Drain Diode Forward**

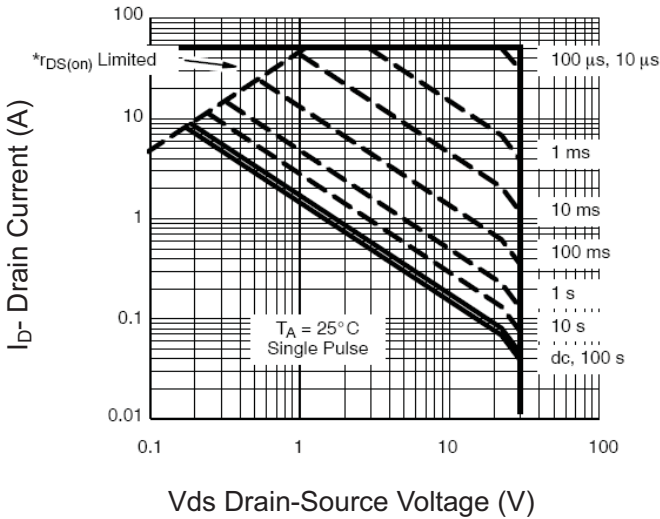
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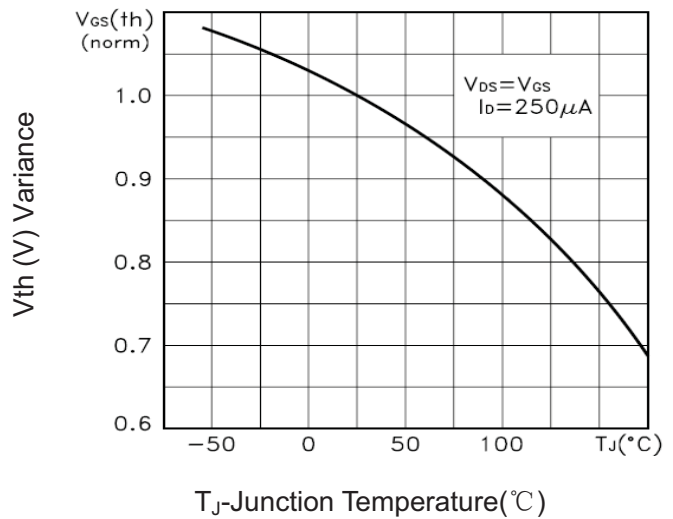
**Figure 7 Capacitance vs Vds**



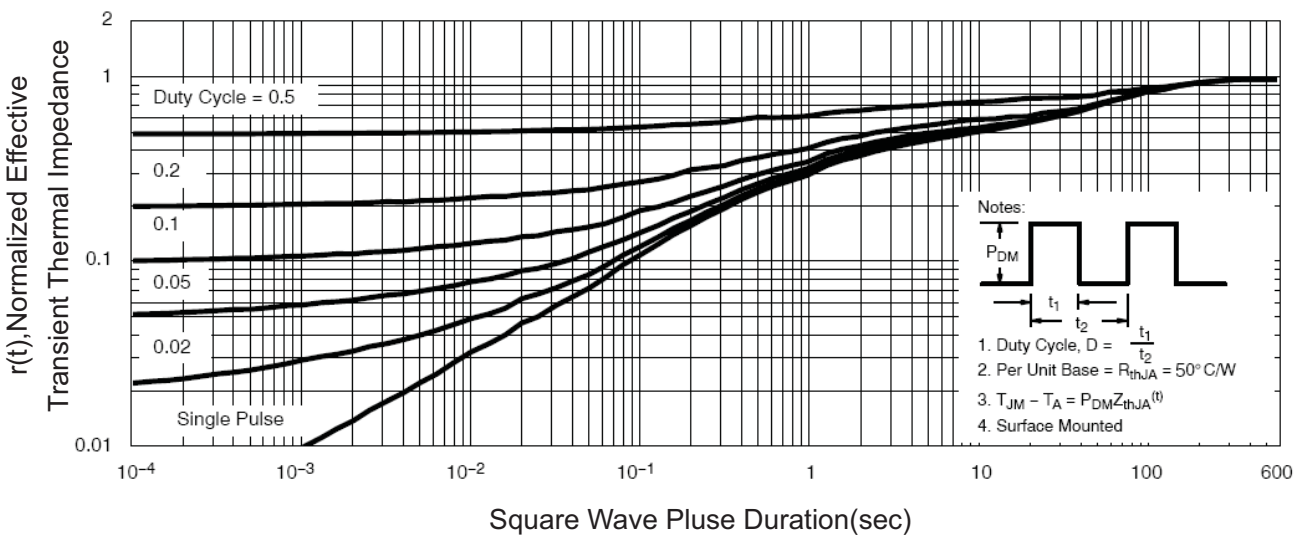
**Figure 9 BV<sub>DSS</sub> vs Junction Temperature**



**Figure 8 Safe Operation Area**

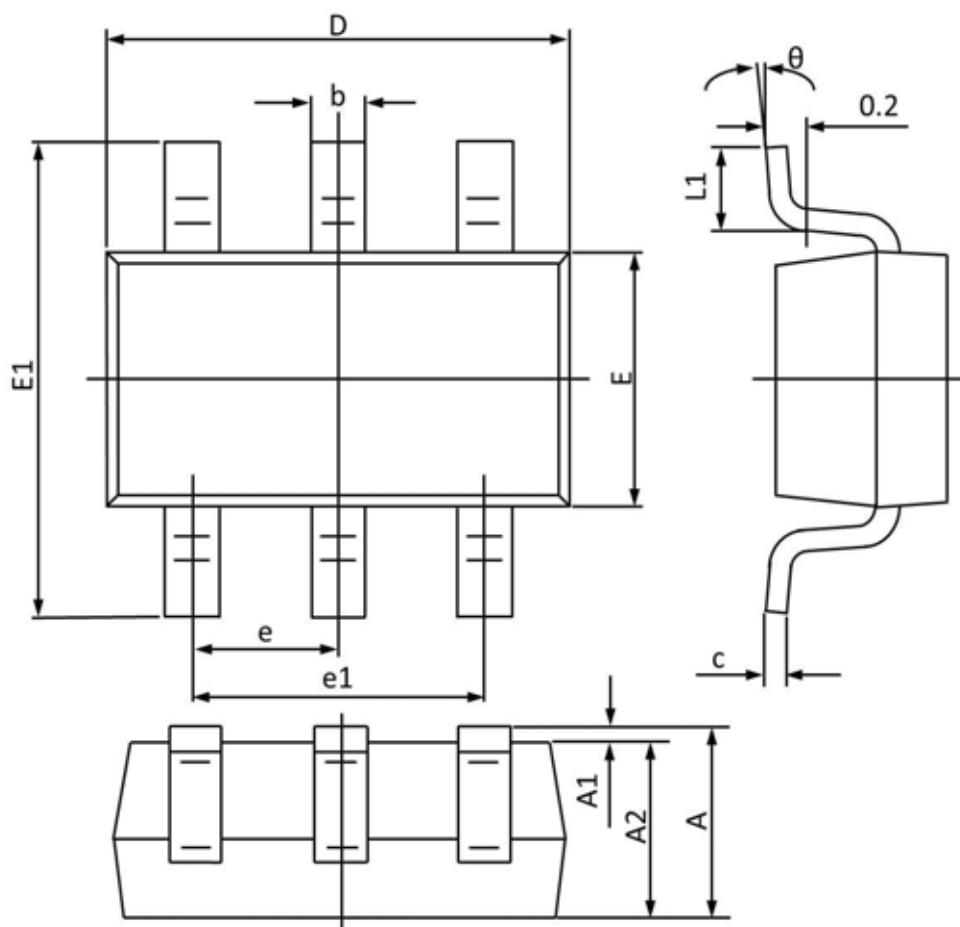


**Figure 10 V<sub>GS(th)</sub> vs Junction Temperature**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## SOT23-6 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.450	-	0.057	-
A1	0.100	0.000	0.004	0.000
A2	1.300	1.050	0.051	0.041
b	0.500	0.300	0.020	0.012
c	0.200	0.100	0.008	0.004
D	3.100	2.700	0.122	0.106
E	1.800	1.400	0.071	0.055
E1	3.000	2.600	0.118	0.102
e	0.95BSC		0.037BSC	
e1	2.000	1.800	0.079	0.071
L1	0.600	0.300	0.024	0.012
θ	10°	0°	10°	0°

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