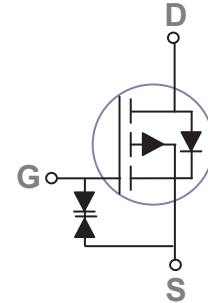


P-Channel Enhancement Mode Power MOSFET

Description

The RM4P20ES6 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.



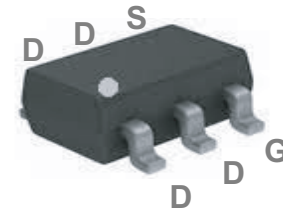
Schematic diagram

General Features

- $V_{DS} = -20V, I_D = -4.1A$
 $R_{DS(ON)} < 80m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- ESD: HBM > 2000V
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management
- Halogen-free



SOT23-6 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
4P20	RM4P20ES6	SOT23-6	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings ($T_A = 25$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current	I_D	$T_C = 25^\circ C$	-4.1
		$T_C = 70^\circ C$	-3.2
		$T_A = 25^\circ C$	-3
		$T_A = 70^\circ C$	-2.3
Drain Current - Pulsed (Note 1)	I_{DM}	-15	A
Maximum Power Dissipation	P_D	1.7	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	74	$^\circ C/W$
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Electrical Characteristics (T_A=25°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	-20	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V, 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	-0.45	-0.7	-1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4.1A	-	39	52	mΩ
		V _{GS} =-2.5V, I _D =-3.6A	-	60	80	
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-2A	6	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =-4V, V _{GS} =0V, F=1.0MHz	-	740	-	PF
Output Capacitance	C _{OSS}		-	290	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	190	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-4V, I _D =-3.3A , R _L =-1.2Ω, V _{GEN} =-4.5V, R _g =1Ω	-	12	-	nS
Turn-on Rise Time	t _r		-	35	-	nS
Turn-Off Delay Time	t _{d(off)}		-	30	-	nS
Turn-Off Fall Time	t _f		-	10	-	nS
Total Gate Charge	Q _g	V _{DS} =-4V, I _D =-4.1A, V _{GS} =-4.5V	-	7.8	-	nC
Gate-Source Charge	Q _{gs}		-	1.2	-	nC
Gate-Drain Charge	Q _{gd}		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-1.6A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	1.6	A

Notes:

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

RATING AND CHARACTERISTICS CURVES (RM4P20ES6)

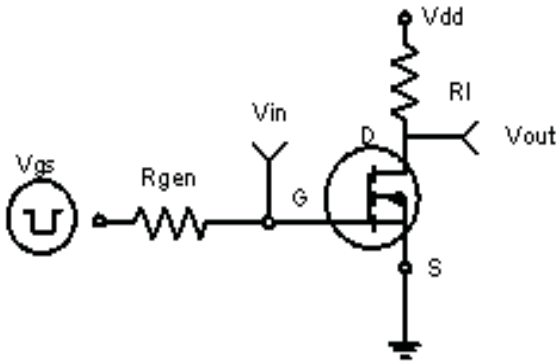


Figure 1: Switching Test Circuit

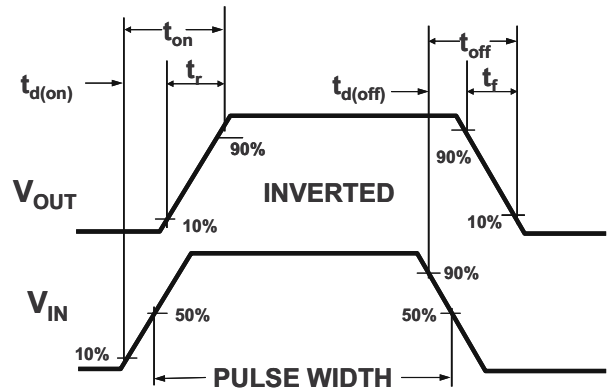
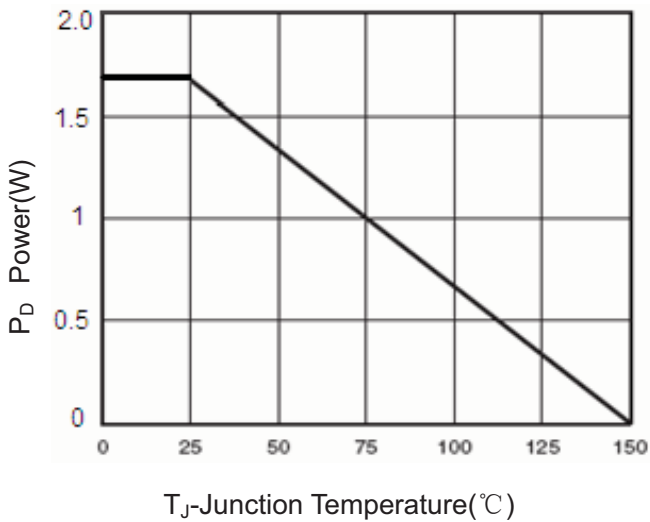
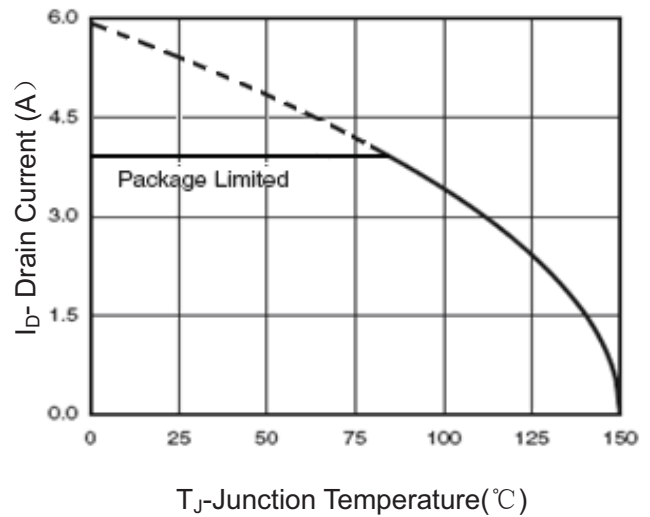


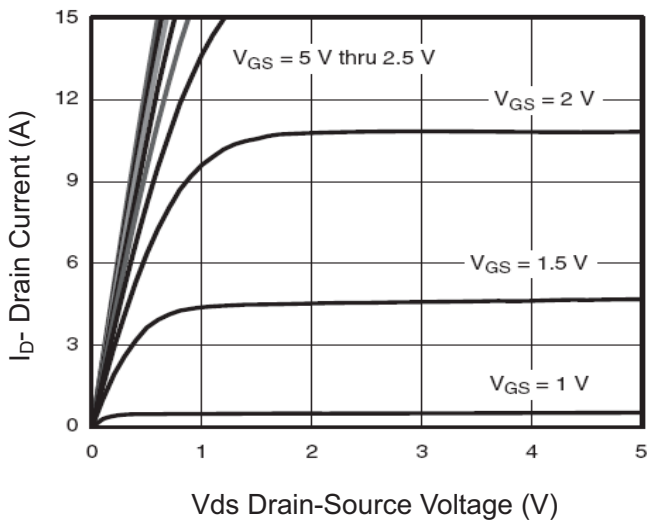
Figure 2: Switching Waveforms



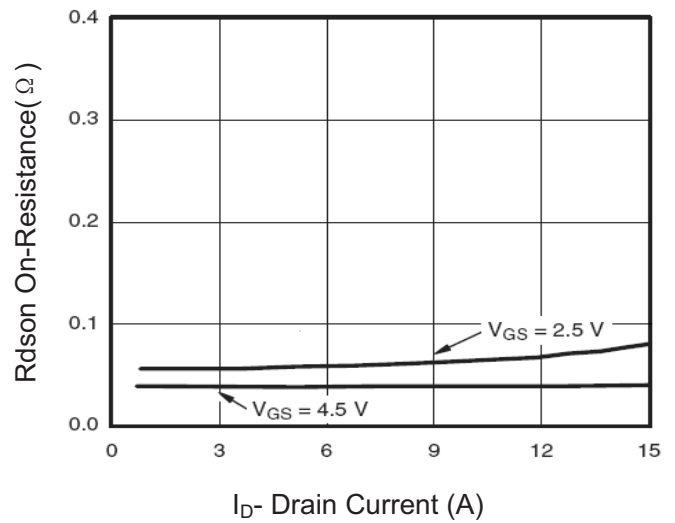
T_J-Junction Temperature(°C)
Figure 3 Power Dissipation



T_J-Junction Temperature(°C)
Figure 4 Drain Current

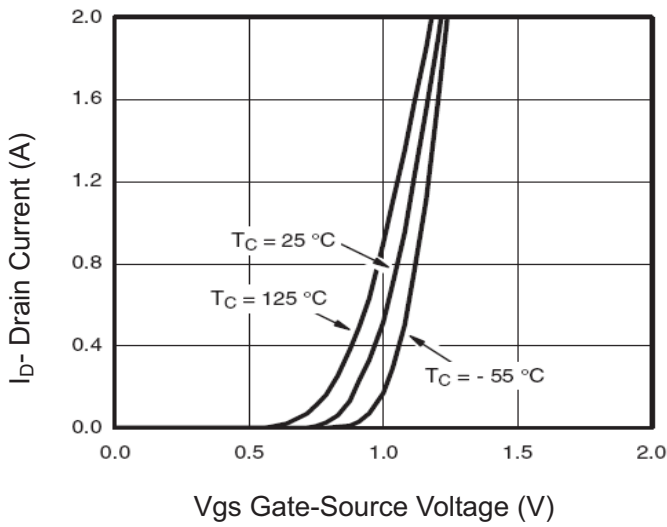


V_{ds} Drain-Source Voltage (V)
Figure 5 Output Characteristics

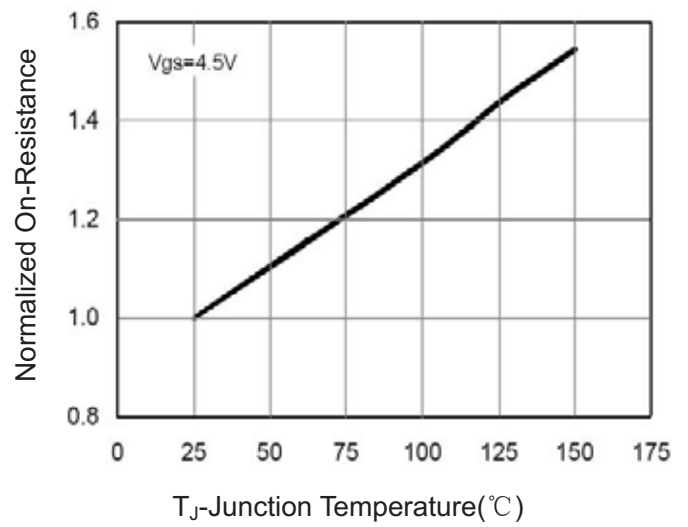


I_D- Drain Current (A)
Figure 6 Drain-Source On-Resistance

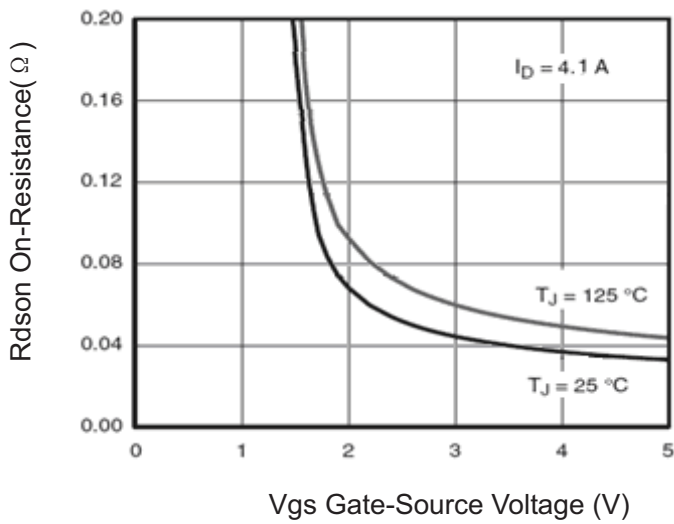
RATING AND CHARACTERISTICS CURVES (RM4P20ES6)



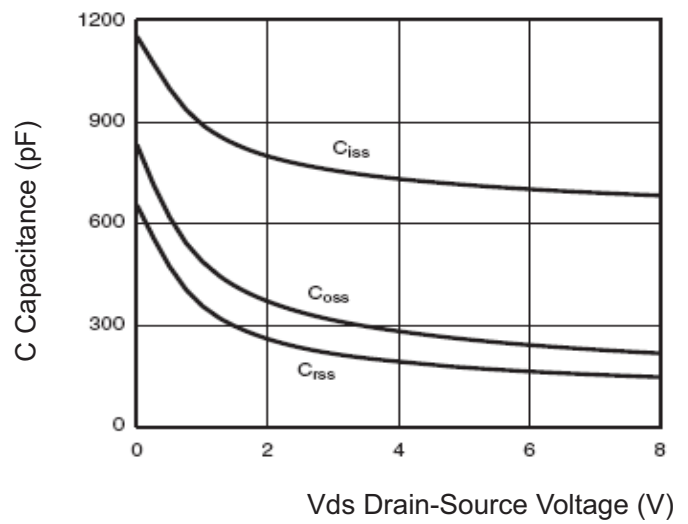
Vgs Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



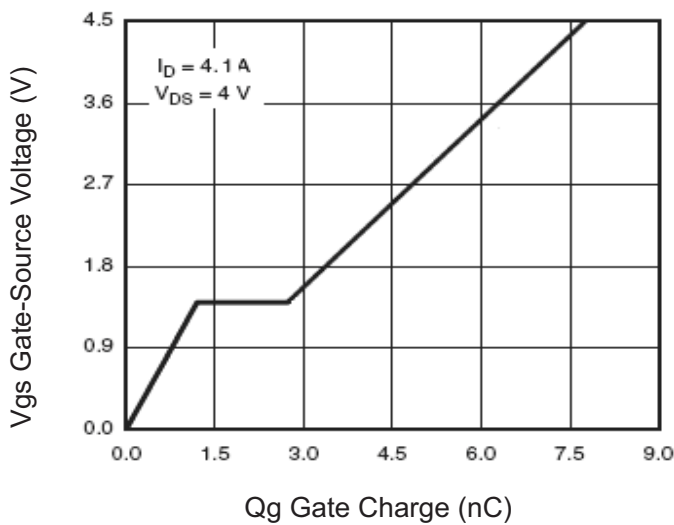
T_J -Junction Temperature($^\circ\text{C}$)
Figure 8 Drain-Source On-Resistance



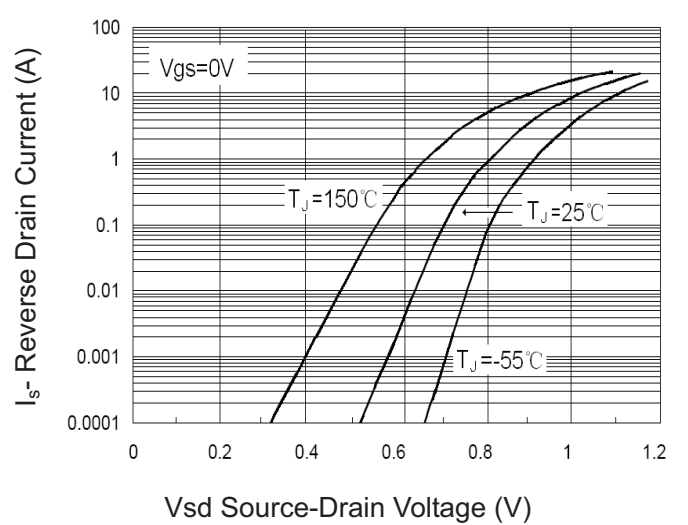
Vgs Gate-Source Voltage (V)
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)
Figure 12 Source-Drain Diode Forward

RATING AND CHARACTERISTICS CURVES (RM4P20ES6)

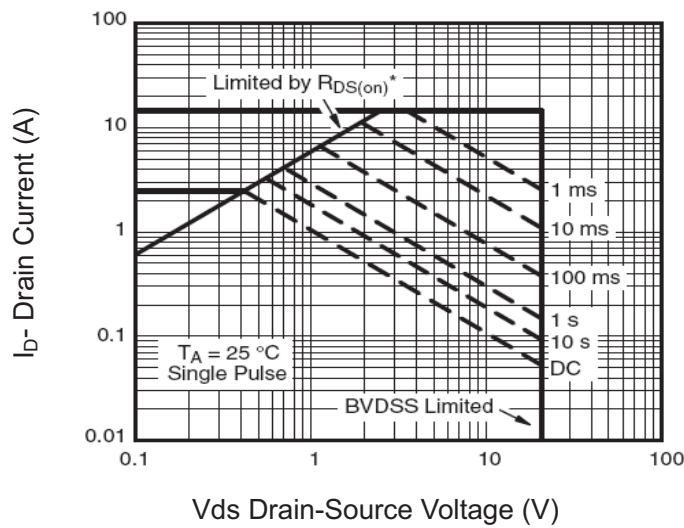


Figure 13 Safe Operation Area

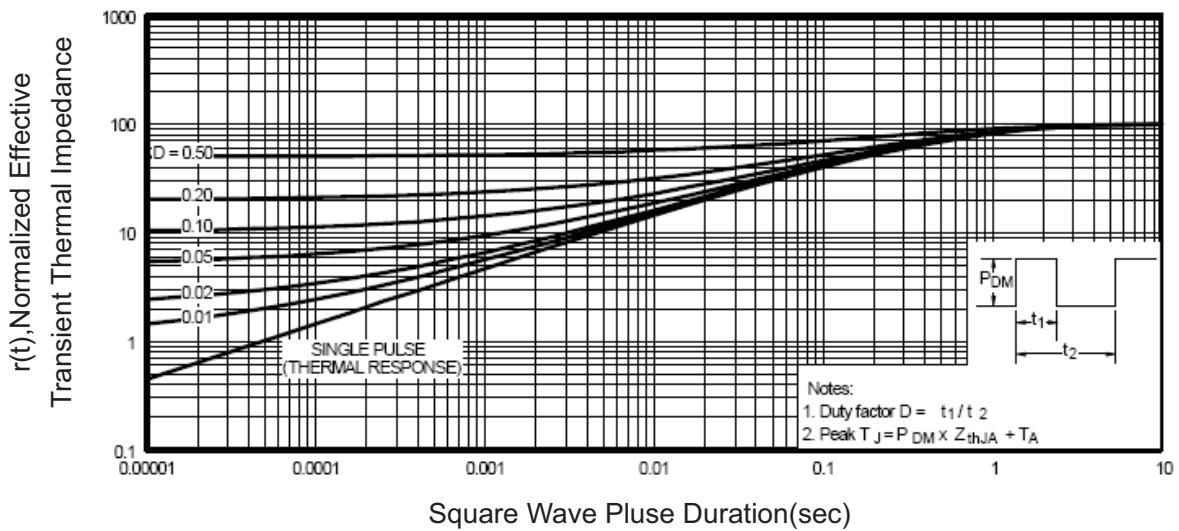
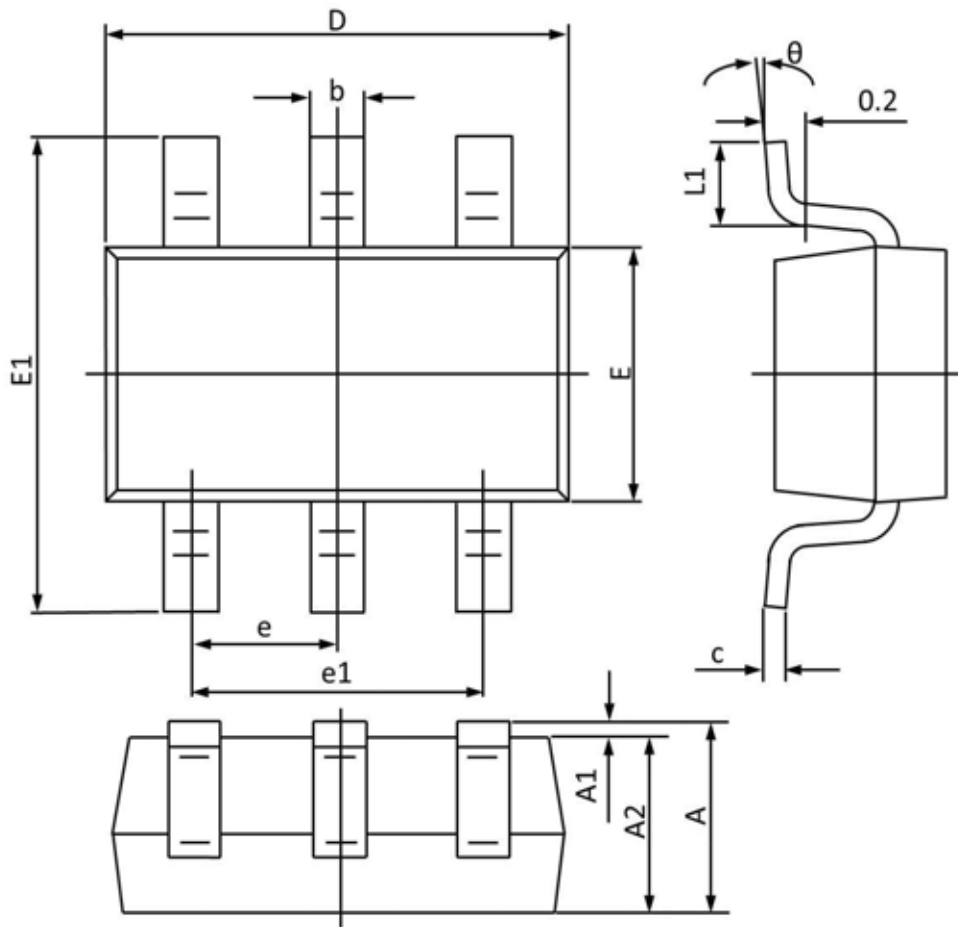


Figure 14 Normalized Maximum Transient Thermal Impedance

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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