

## P-Channel Enhancement Mode Power MOSFET

### Description

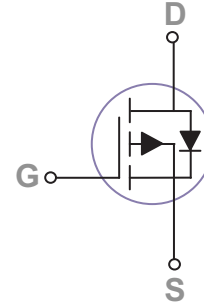
The RM5A1P30S6 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

### General Features

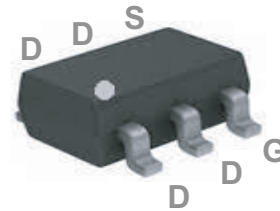
- $V_{DS} = -30V, I_D = -5.1A$   
 $R_{DS(ON)} < 46m\Omega @ V_{GS} = -4.5V$   
 $R_{DS(ON)} < 32m\Omega @ V_{GS} = -10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

- PWM applications
- Load switch
- Power management
- P/N suffix V means AEC-Q101 qualified, e.g:RM5A1P30S6V
- Halogen-free



Schematic diagram



SOT-23-6 top view

### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
5A1P30	RM5A1P30S6	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	$I_D$	-5.1	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-20.4	A
Maximum Power Dissipation	$P_D$	1.56	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	80	$^\circ C / W$
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### Electrical Characteristics ( $T_A = 25^\circ C$ unless otherwise noted)

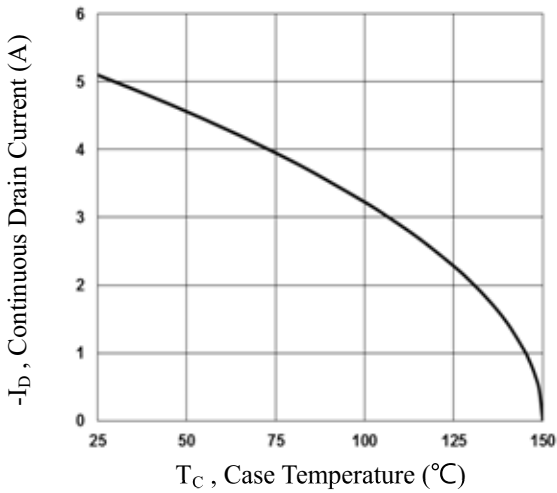
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30		-	V

Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	-1.6	-2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-4A$	-	27	32	m $\Omega$
		$V_{GS}=-4.5V, I_D=-2A$	-	38	46	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-10V, I_D=-3A$	-	9	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	757	1280	PF
Output Capacitance	$C_{oss}$		-	122	210	PF
Reverse Transfer Capacitance	$C_{rss}$		-	88	175	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-1A$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	4.6	9	nS
Turn-on Rise Time	$t_r$		-	14	26	nS
Turn-Off Delay Time	$t_{d(off)}$		-	34	58	nS
Turn-Off Fall Time	$t_f$		-	18	35	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-5A, V_{GS}=-4.5V$	-	8	15	nC
Gate-Source Charge	$Q_{gs}$		-	3.3	6	nC
Gate-Drain Charge	$Q_{gd}$		-	2.3	5	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-1A$	-	-	-1	V

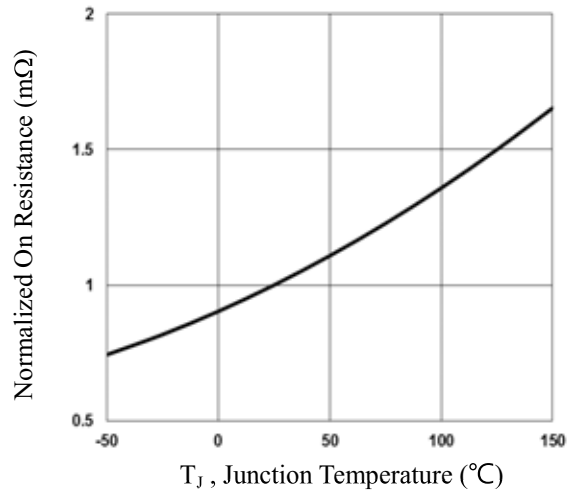
### Notes:

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

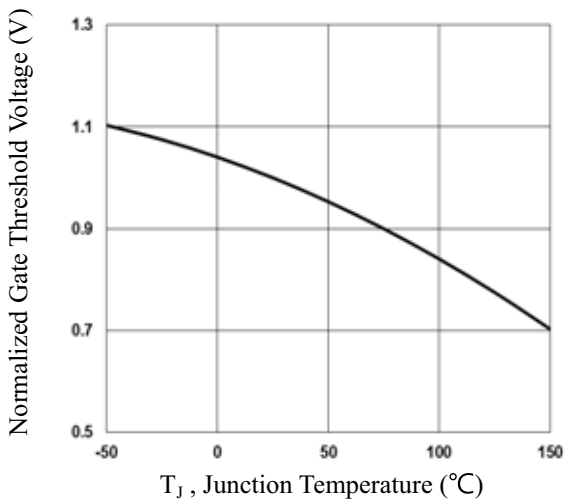
## RATING AND CHARACTERISTICS CURVES (RM5A1P30S6)



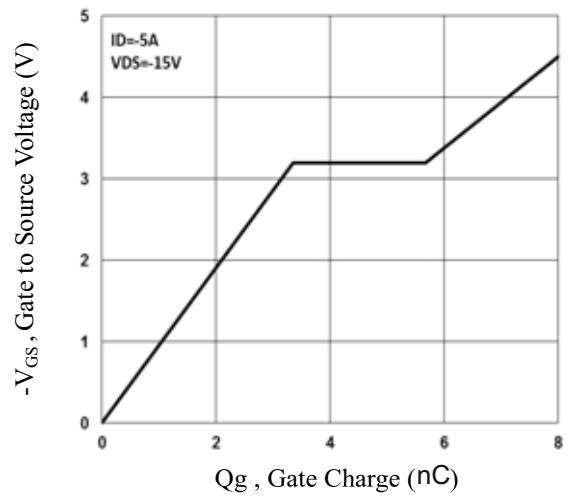
**Fig.1 Continuous Drain Current vs.  $T_C$**



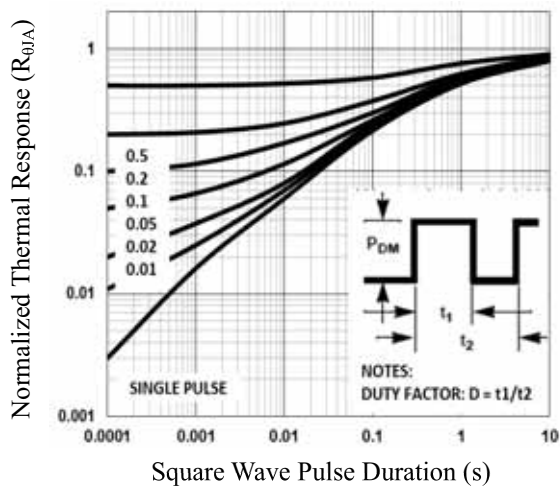
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$**



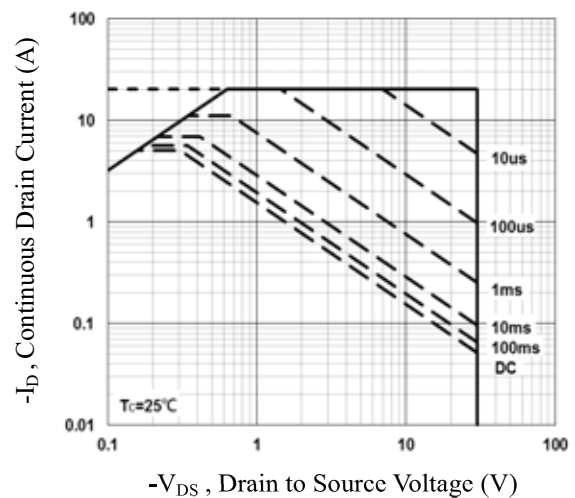
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**



**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

## RATING AND CHARACTERISTICS CURVES (RM5A1P30S6)

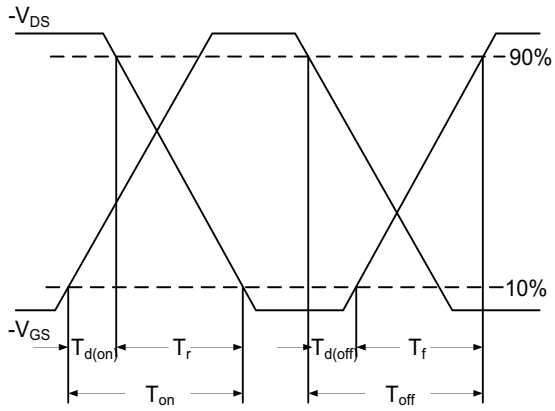


Fig.7 Switching Time Waveform

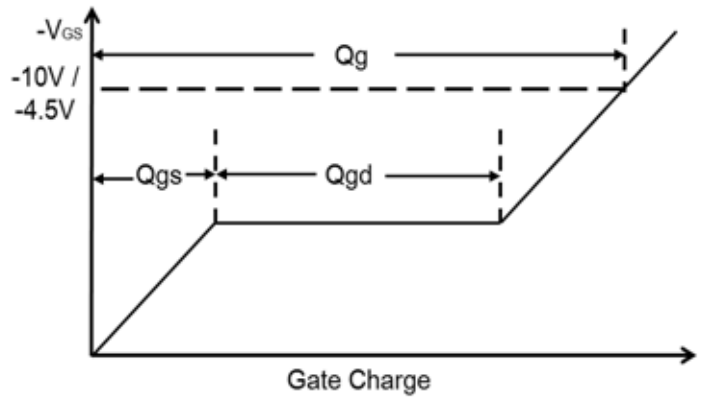
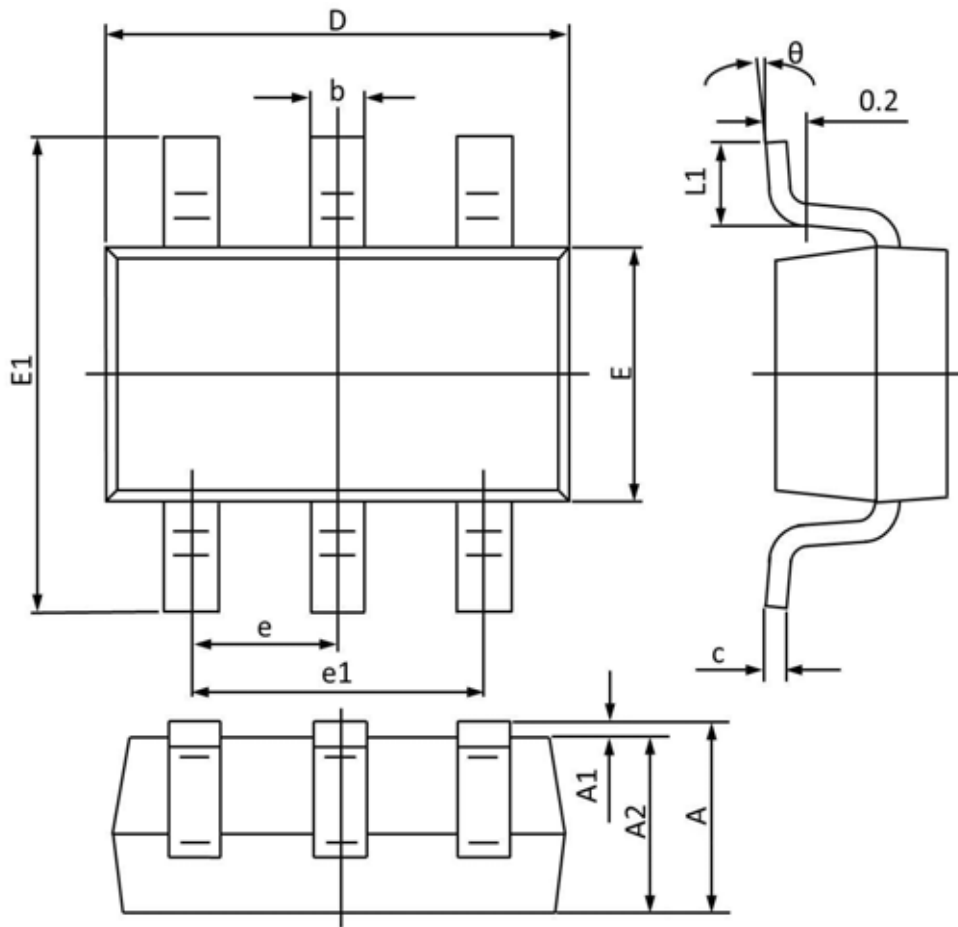


Fig.8 Gate Charge Waveform

## 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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