

## P-Channel Enhancement Mode Power MOSFET

### Description

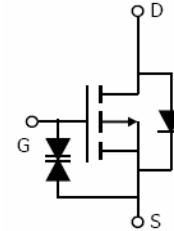
The RM2309E uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

### General Features

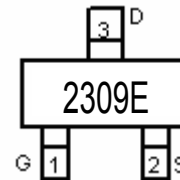
- $V_{DS} = -30V, I_D = -3.5A$   
 $R_{DS(ON)} < 38 \text{ m}\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 70 \text{ m}\Omega @ V_{GS} = -4.5V$   
 ESD Rating: 2000V HBM
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

- Load switch
- Halogen-free
- P/N suffix V means AEC-Q101 qualified, e.g:RM2309EV



Schematic diagram



Marking and pin assignment



SOT-23 top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
2309E	RM2309E	SOT-23	Ø180mm	8 mm	3000 units

### Limiting Values

Symbol	Parameter	Rating	Unit
$V_{DSS}$	Drain-Source Voltage	- 30	V
$V_{GSS}$	Gate-Source Voltage	± 20	

### Electrical Characteristics ( $T_a = 25 \text{ }^\circ\text{C}$ Unless Otherwise Noted )

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{DS} = -250 \text{ }\mu\text{A}$	- 30	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = -250 \text{ }\mu\text{A}$	- 1.3	- 1.8	- 2.5	V
$I_{DSS}$	Drain Leakage Current	$V_{DS} = -24 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-1	$\mu\text{A}$
		$T_J = 85 \text{ }^\circ\text{C}$	-	-	- 30	$\mu\text{A}$
$I_{GSS}$	Gate Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	± 10	$\mu\text{A}$
$R_{DS(ON)}^a$	On-State Resistance	$V_{GS} = -10 \text{ V}, I_{DS} = -1 \text{ A}$	-	30	38	m $\Omega$
		$V_{GS} = -4.5 \text{ V}, I_{DS} = -1 \text{ A}$	-	55	70	
Diode Characteristics						
$V_{SD}$	Diode Forward Voltage	$I_{SD} = -1 \text{ A}, V_{GS} = 0 \text{ V}$	-	- 0.7	- 1.3	V

# RATING AND CHARACTERISTICS CURVES (RM2309E)

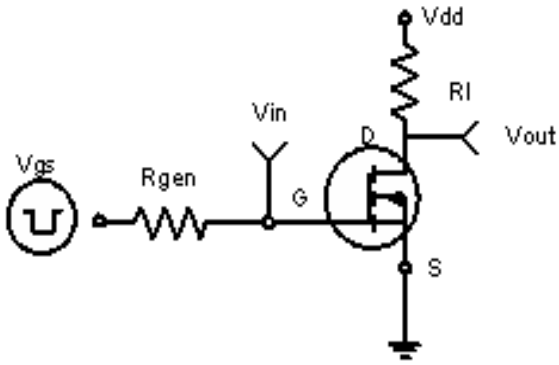


Figure 1: Switching Test Circuit

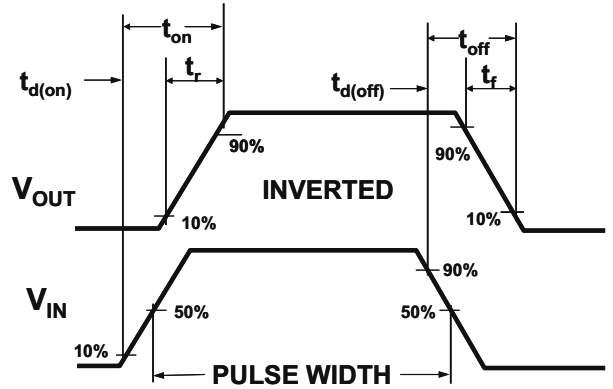


Figure 2: Switching Waveforms

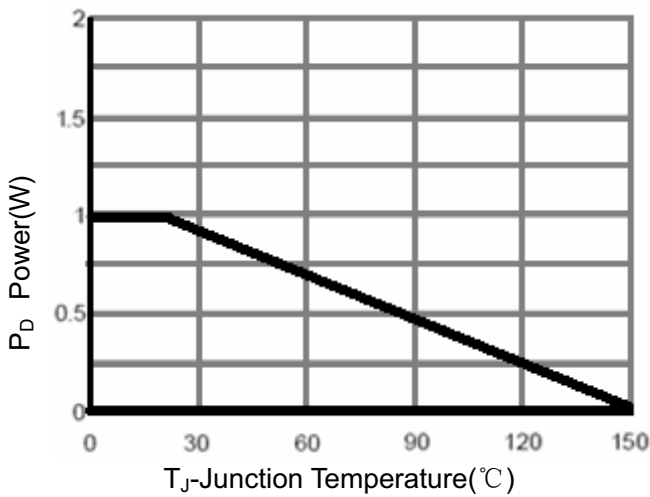


Figure 3 Power Dissipation

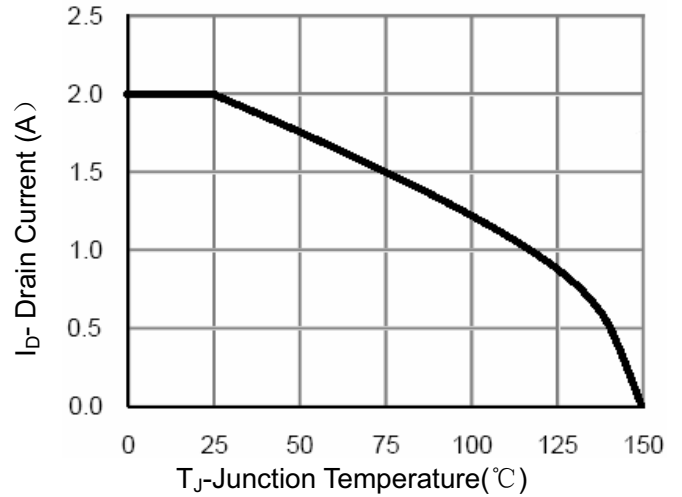


Figure 4 Drain Current

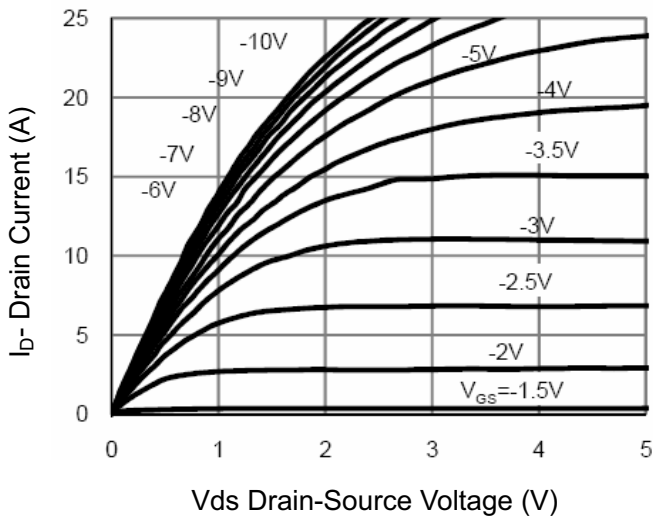


Figure 5 Output Characteristics

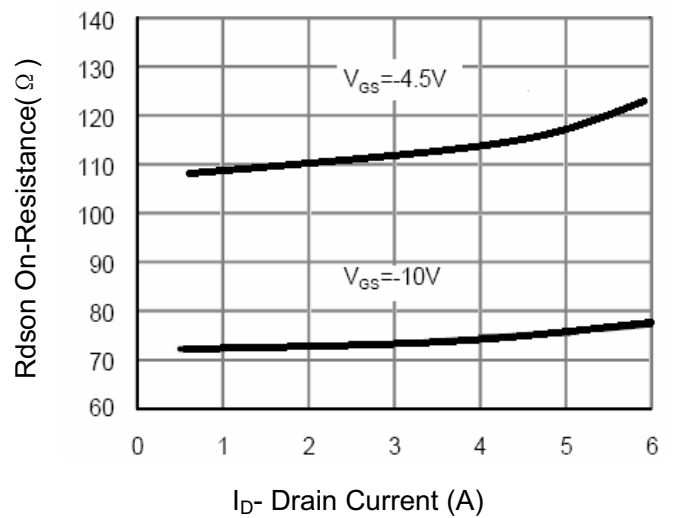
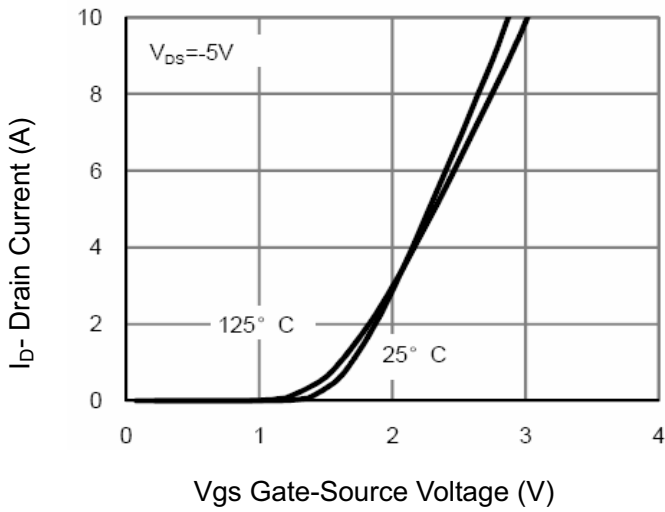
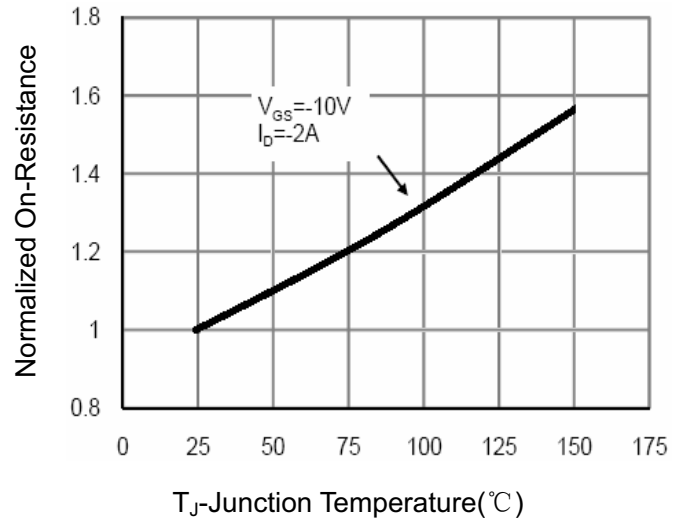


Figure 6 Drain-Source On-Resistance

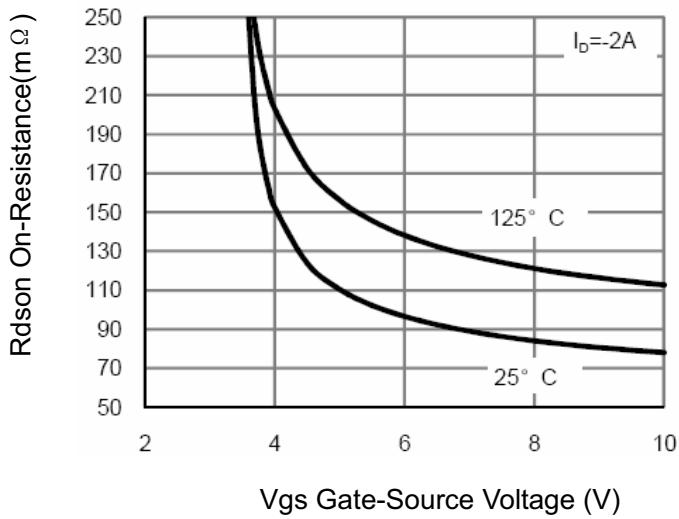
# RATING AND CHARACTERISTICS CURVES (RM2309E)



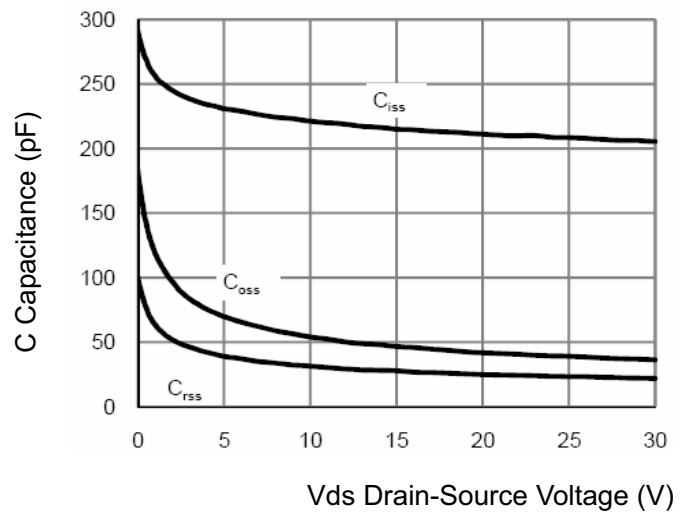
**Figure 7 Transfer Characteristics**



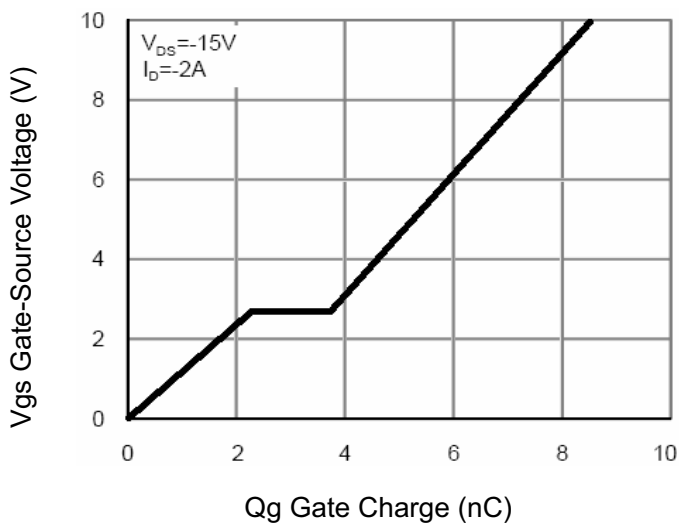
**Figure 8 Drain-Source On-Resistance**



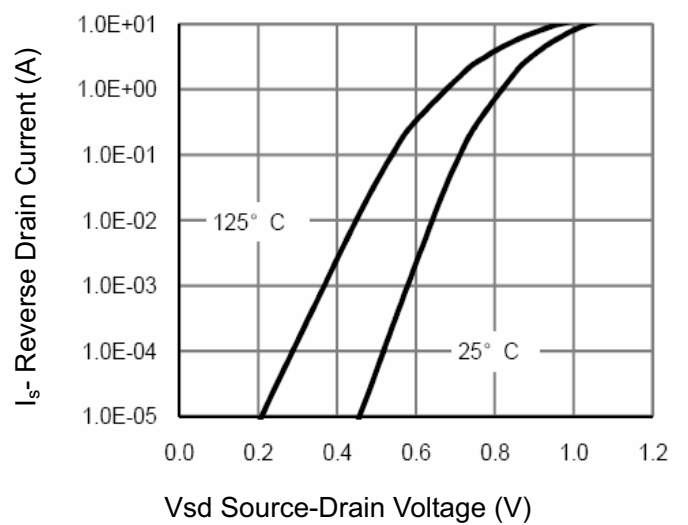
**Figure 9 Rdson vs Vgs**



**Figure 10 Capacitance vs Vds**

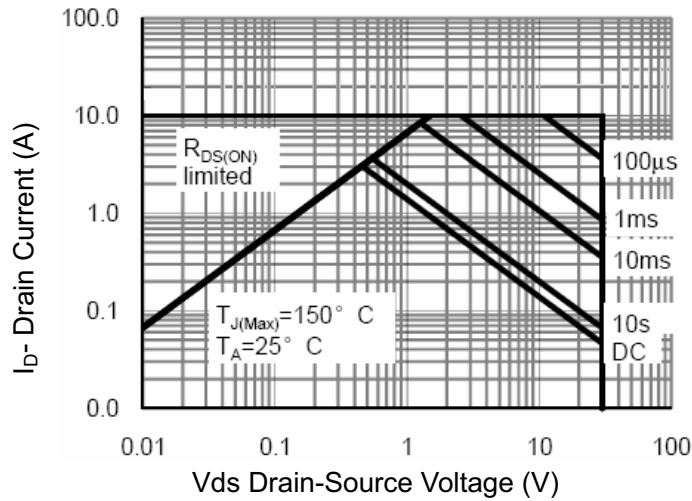


**Figure 11 Gate Charge**

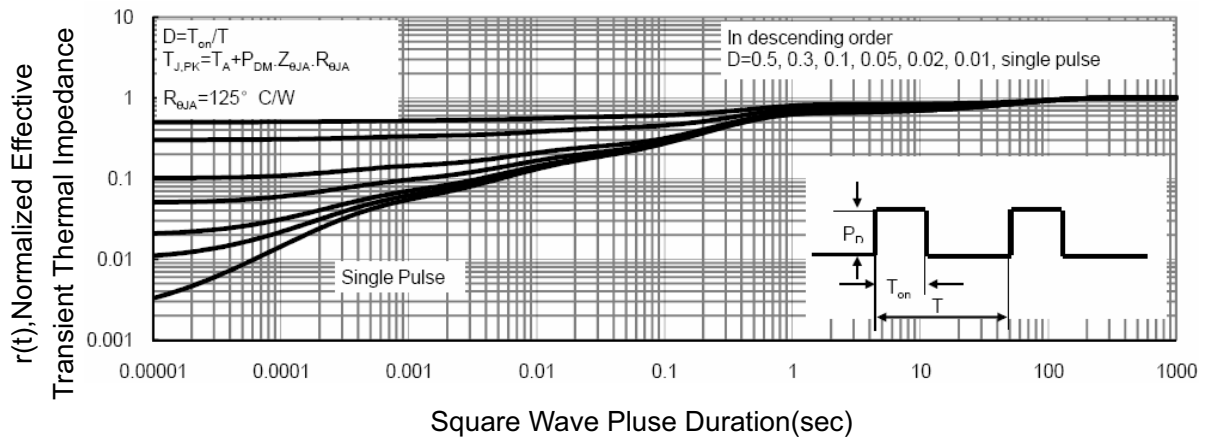


**Figure 12 Source- Drain Diode Forward**

# RATING AND CHARACTERISTICS CURVES (RM2309E)

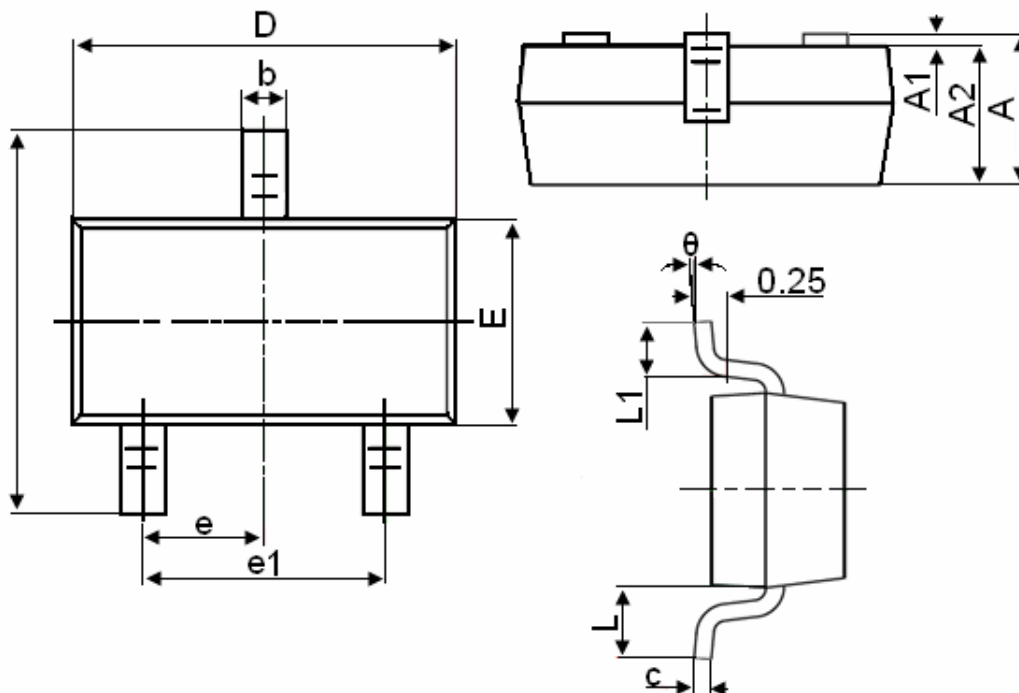


**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

## SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

### Notes

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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