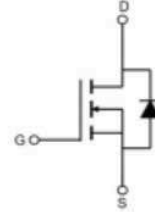


## Feature

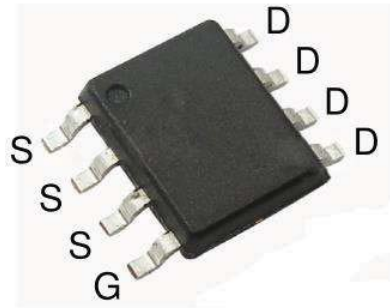
- 40V,10A  
 $R_{DS(ON)} < 22m\Omega @ V_{GS}=10V$   
 $R_{DS(ON)} < 30m\Omega @ V_{GS}=4.5V$
- Trench Power MOSFET
- Fast Switching
- Low on-resistance and maximum



Schematic Diagram

## Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Halogen-free



SOP-8

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
4013S	RM10N40S8	SOP-8	13 inch	-	4000

## ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a=25^\circ\text{C}$ )	$I_D$	10	A
Continuous Drain Current ( $T_a=100^\circ\text{C}$ )	$I_D$	6.5	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	40	A
Power Dissipation	$P_D$	2	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

## MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(2)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	1.5	2.5	V
Drain-source on-resistance <sup>(2)</sup>	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 10A$	-	17	22	m $\Omega$
		$V_{GS} = 4.5V, I_D = 6A$	-	22	30	
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$	-	1050	-	pF
Output Capacitance	$C_{oss}$		-	84	-	
Reverse Transfer Capacitance	$C_{rss}$		-	72	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 20V, R_L = 1.5\Omega$ $V_{GS} = 10V, R_G = 3\Omega$	-	11	-	ns
Turn-on rise time	$t_r$		-	13	-	
Turn-off delay time	$t_{d(off)}$		-	36	-	
Turn-off fall time	$t_f$		-	9	-	
Total Gate Charge	$Q_g$	$V_{DS} = 20V, I_D = 5A,$ $V_{GS} = 10V$	-	11	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.9	-	
Gate-Drain Charge	$Q_{gd}$		-	2.2	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(2)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = 10A$	-	-	1.2	V
Diode Forward current <sup>(3)</sup>	$I_S$		-	-	40	A

### Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. Surface Mounted on FR4 Board,  $t \leq 10$  sec

# RATING AND CHARACTERISTICS CURVES (RM10N40S8)

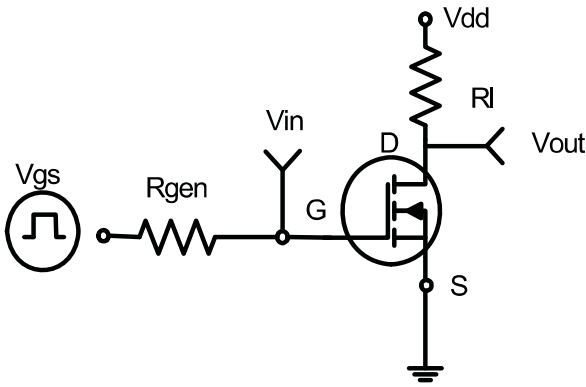


Figure 1: Switching Test Circuit

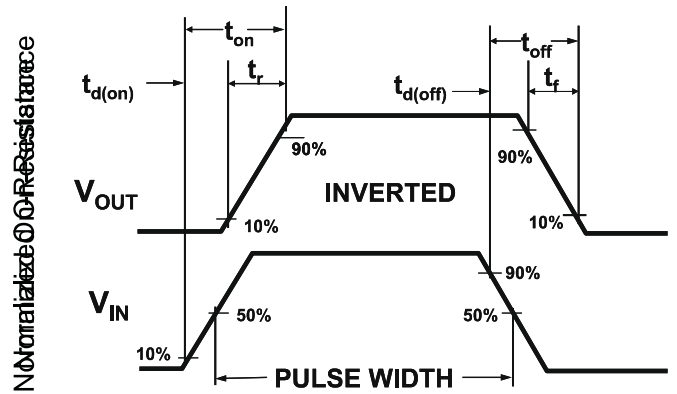
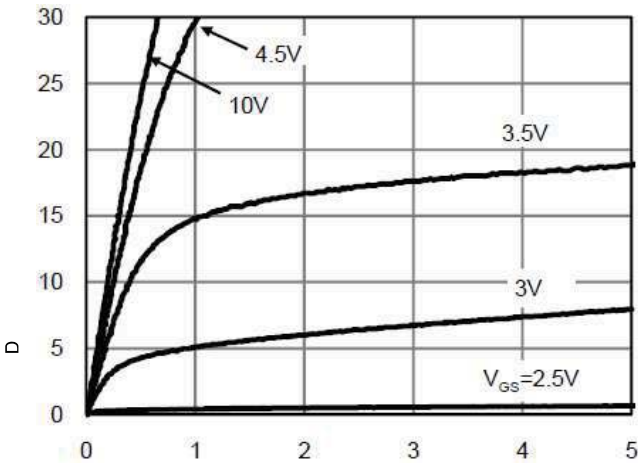
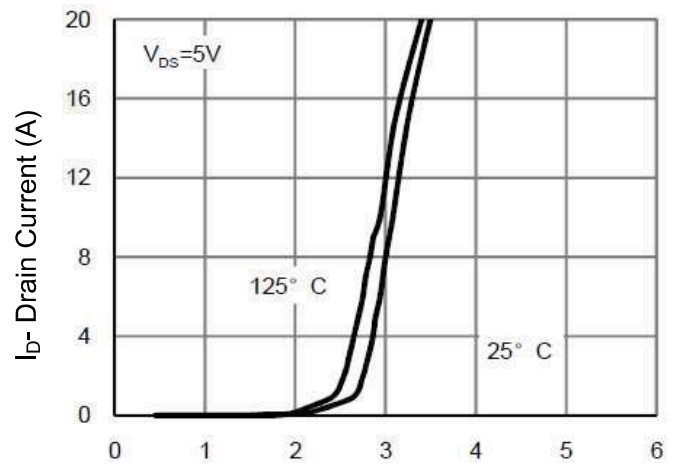


Figure 2: Switching Waveforms



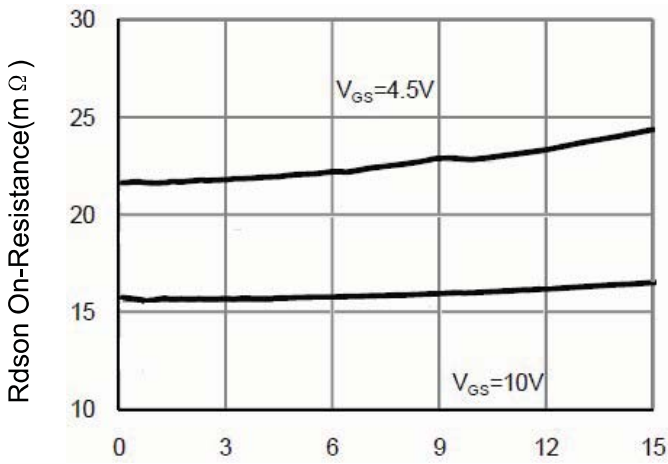
Vds Drain-Source Voltage (V)

Figure 3 Output Characteristics



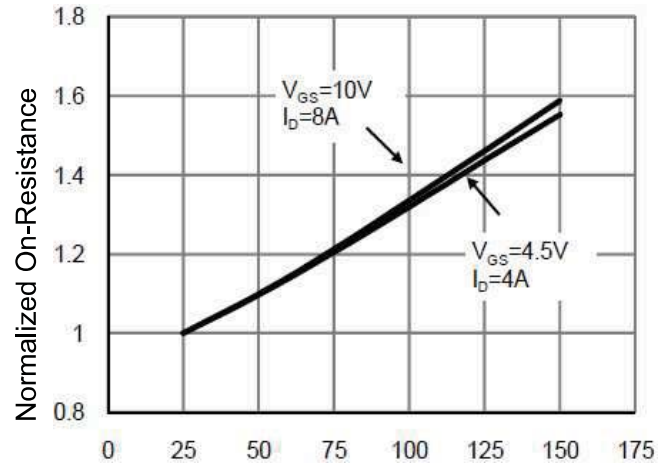
Vgs Gate-Source Voltage (V)

Figure 4 Transfer Characteristics



Id Drain Current (A)

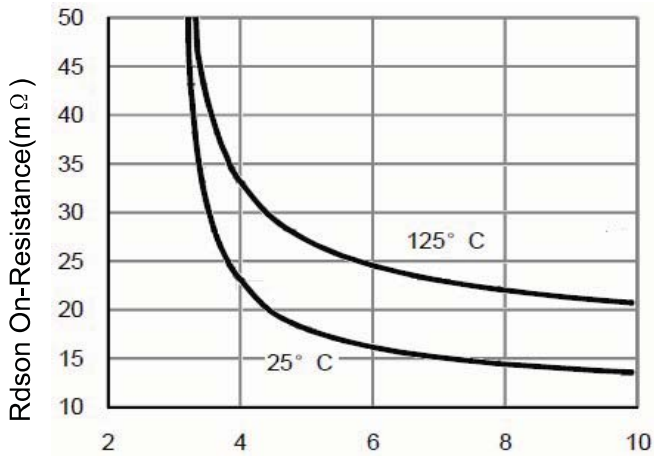
Figure 5 Drain-Source On-Resistance



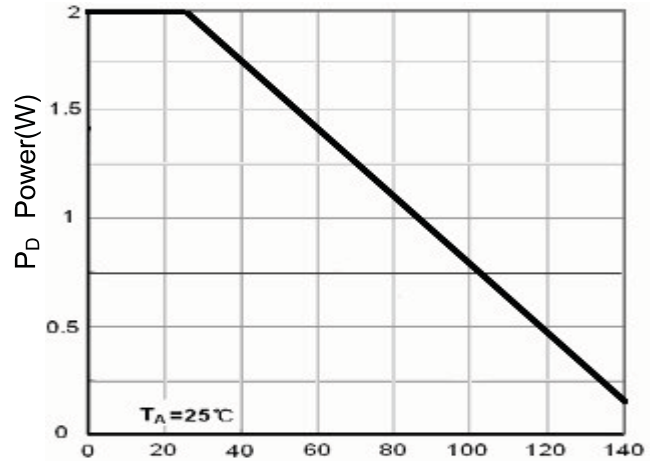
Tj Junction Temperature (°C)

Figure 6 Drain-Source On-Resistance

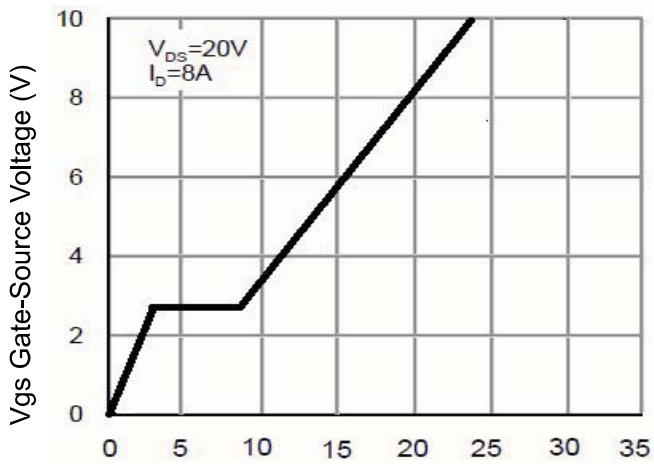
## RATING AND CHARACTERISTICS CURVES (RM10N40S8)



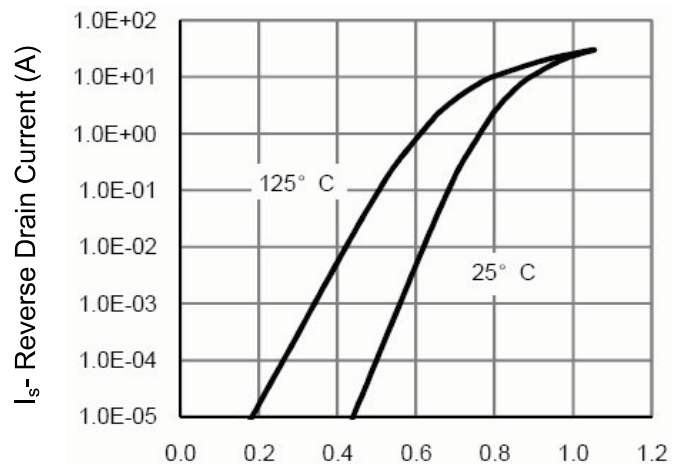
Vgs Gate-Source Voltage (V)  
**Figure 7 Rdson vs Vgs**



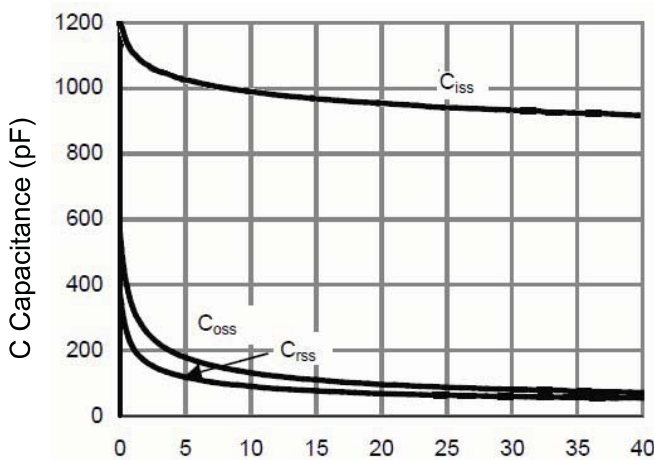
Tj Junction Temperature (°C)  
**Figure 8 Power Dissipation**



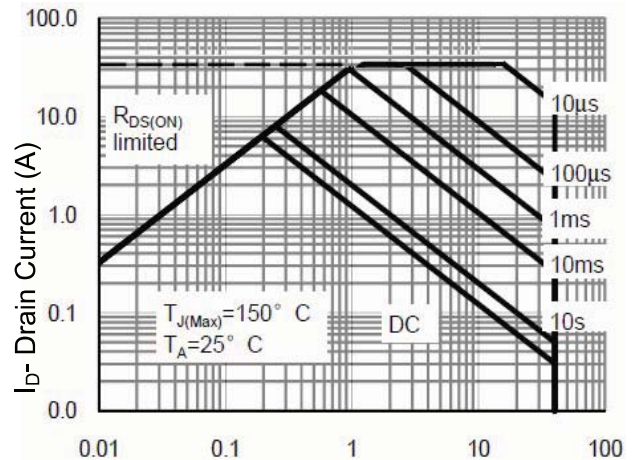
Qg Gate Charge (nC)  
**Figure 9 Gate Charge**



Vds Drain-Source Voltage (V)  
**Figure 10 Source-Drain Diode Forward**

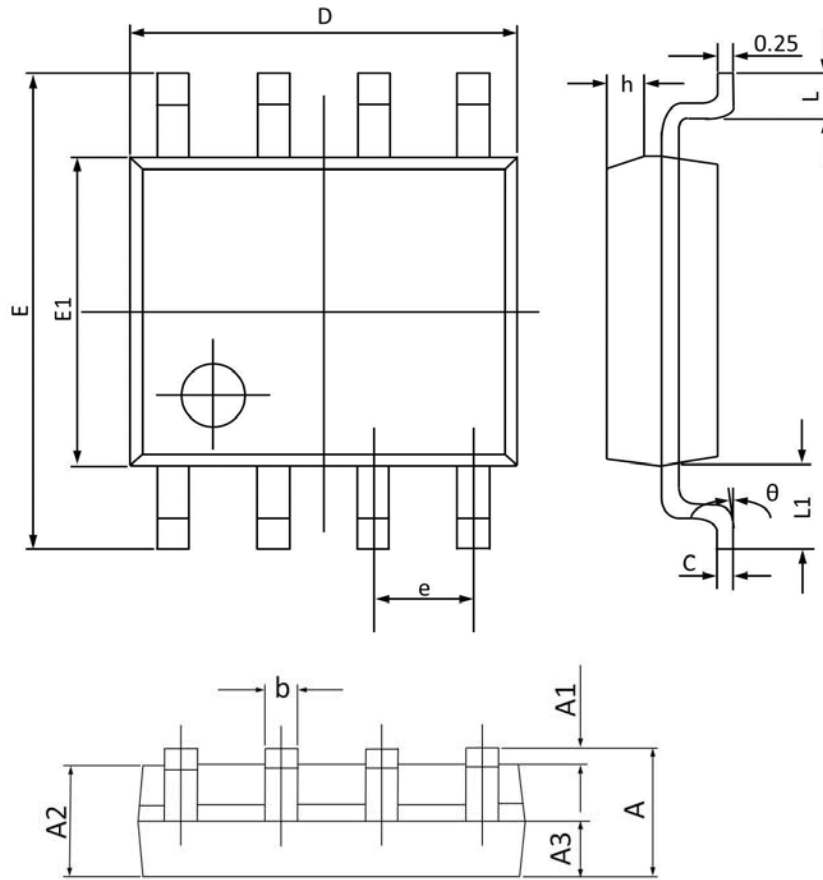


Vds Drain-Source Voltage (V)  
**Figure 11 Capacitance vs Vds**



Vds Drain-Source Voltage (V)  
**Figure 12 Safe Operation Area**

## SOP8 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.068
A1	0.100	0.250	0.004	0.009
A2	1.300	1.500	0.052	0.059
A3	0.600	0.700	0.024	0.027
b	0.390	0.480	0.016	0.018
c	0.210	0.260	0.009	0.010
D	4.700	5.100	0.186	0.200
E	5.800	6.200	0.229	0.244
E1	3.700	4.100	0.146	0.161
e	1.270(BSC)		0.050(BSC)	
h	0.250	0.500	0.010	0.019
L	0.500	0.800	0.019	0.031
L1	1.050(BSC)		0.041(BSC)	
$\theta$	0°	8°	0°	8°

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