

P-Channel Enhancement Mode Power MOSFET

Description

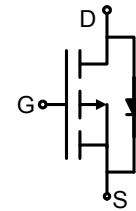
The MS23P01S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

General Features

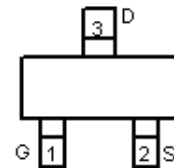
- $V_{DS} = -20V, I_D = -2.6A$
 $R_{DS(ON)} < 160m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 120m\Omega @ V_{GS} = -4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch



Schematic diagram



Marking and pin assignment



SC70-3/ SOT-323 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
A1SHB	MS23P01S	SOT-23	Ø180mm	8 mm	3000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	-2.6	A
Drain Current -Pulsed ^(Note 1)	I_{DM}	-13	A
Maximum Power Dissipation	P_D	0.9	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	138	$^\circ\text{C/W}$
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Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-20		-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20V, V_{GS} = 0V$	-	-	-1	μA

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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	-0.4	-0.7	-1	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-2 A	-	78	120	mΩ
		V _{GS} =-2.5V, I _D =-1.8A	-	102	160	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V,I _D =-1A	6	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-10V,V _{GS} =0V, F=1.0MHz	-	325	-	PF
Output Capacitance	C _{oss}		-	63	-	PF
Reverse Transfer Capacitance	C _{rss}		-	37	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, R _L =5Ω V _{GS} =-4.5V,R _{GEN} =3Ω	-	11	-	nS
Turn-on Rise Time	t _r		-	5.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	22	-	nS
Turn-Off Fall Time	t _f		-	8	-	nS
Total Gate Charge	Q _g	V _{DS} =-10V,I _D =-2A, V _{GS} =-4.5V	-	3.2	-	nC
Gate-Source Charge	Q _{gs}		-	0.6	-	nC
Gate-Drain Charge	Q _{gd}		-	0.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =2A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-2.6	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

Typical Electrical and Thermal Characteristics

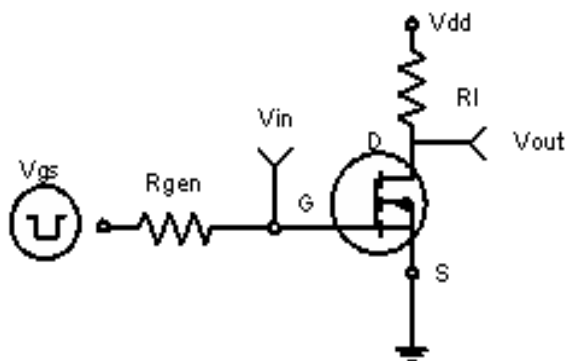


Figure 1: Switching Test Circuit

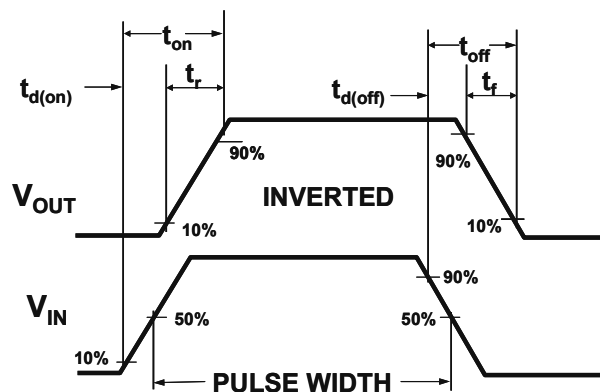


Figure 2: Switching Waveforms

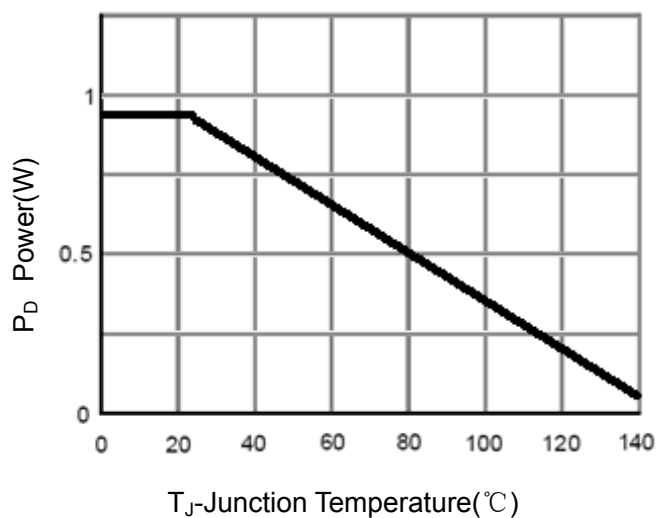


Figure 3 Power Dissipation

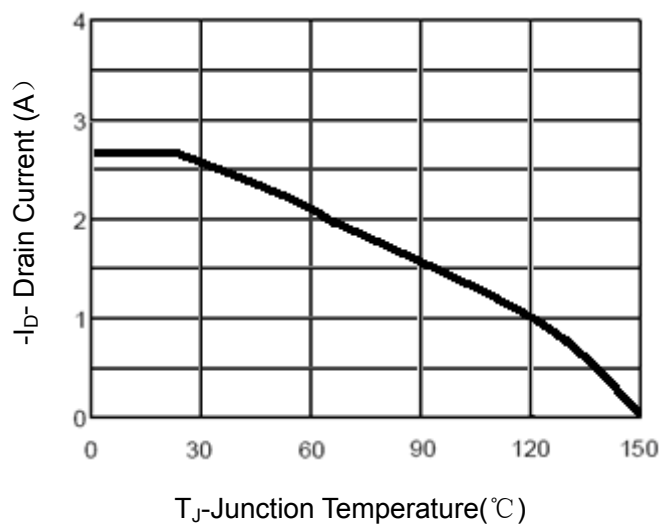


Figure 4 Drain Current

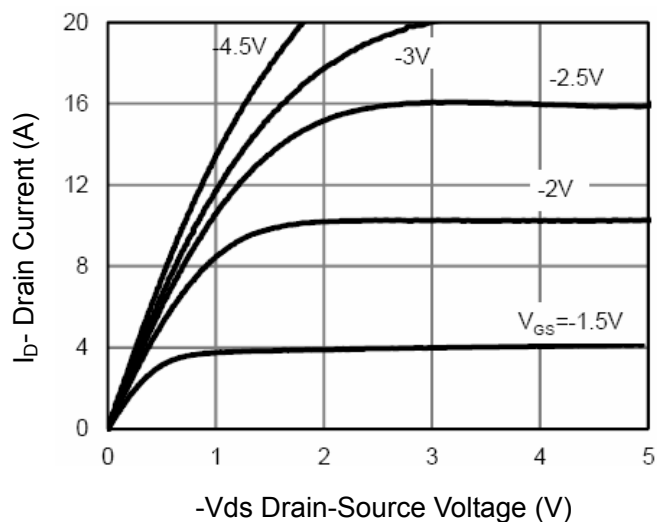


Figure 5 Output Characteristics

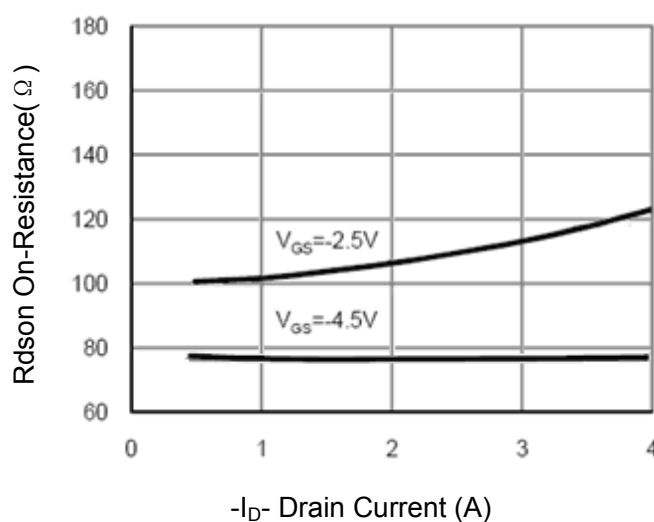


Figure 6 Drain-Source On-Resistance

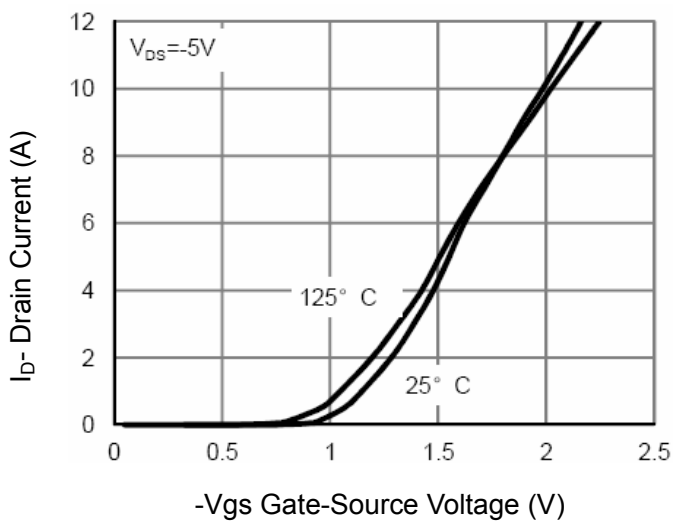


Figure 7 Transfer Characteristics

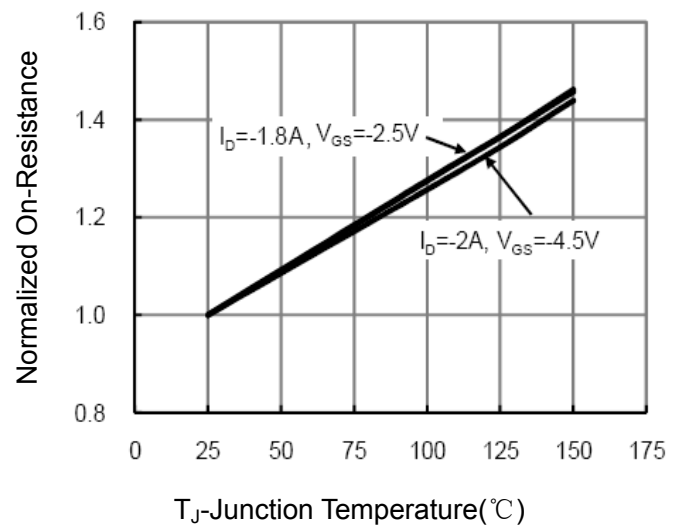


Figure 8 Drain-Source On-Resistance

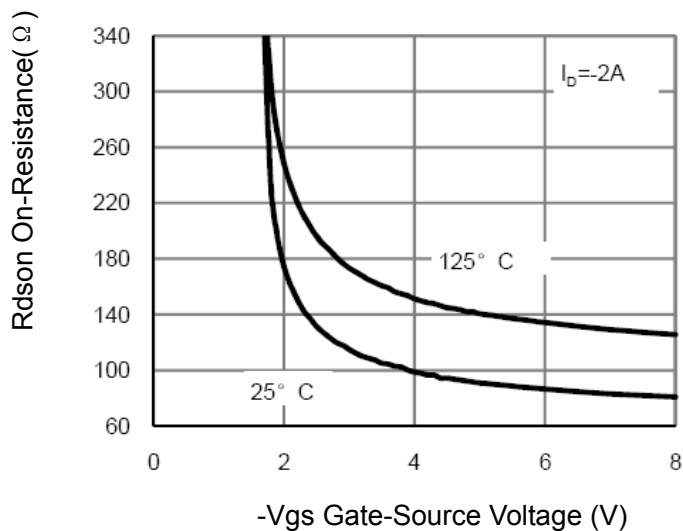


Figure 9 Rdson vs Vgs

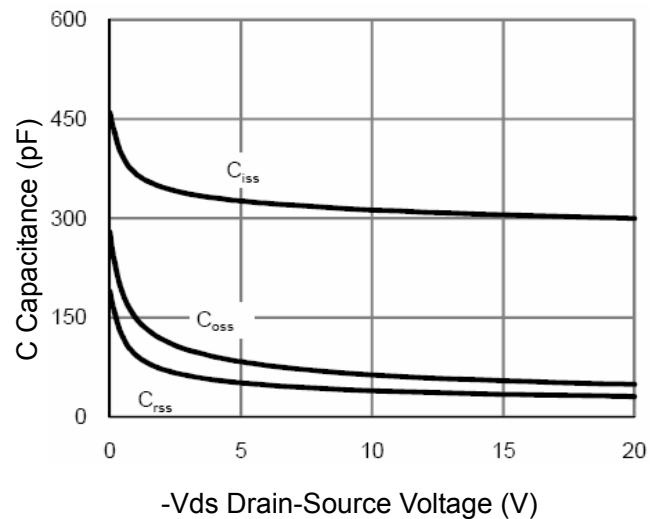


Figure 10 Capacitance vs Vds

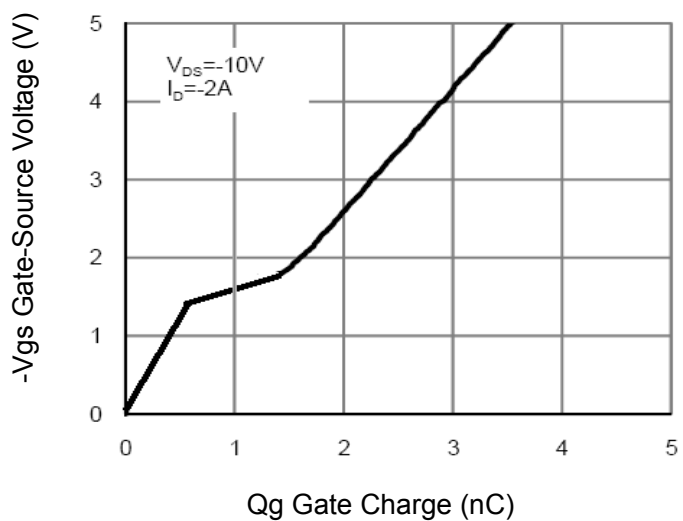


Figure 11 Gate Charge

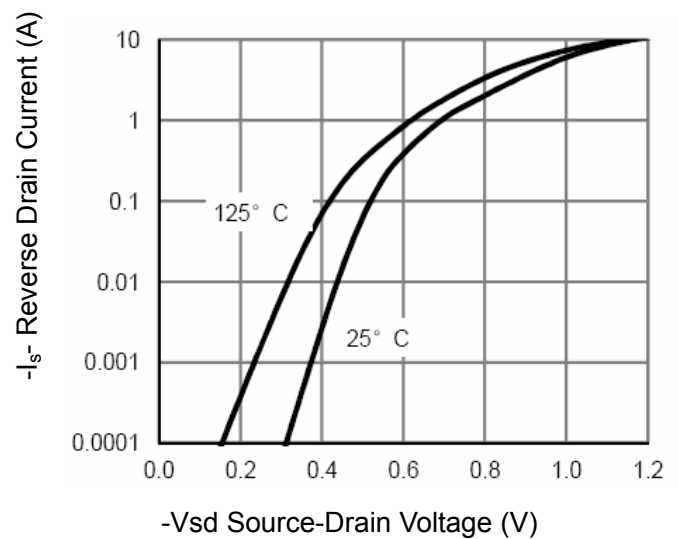


Figure 12 Source- Drain Diode Forward

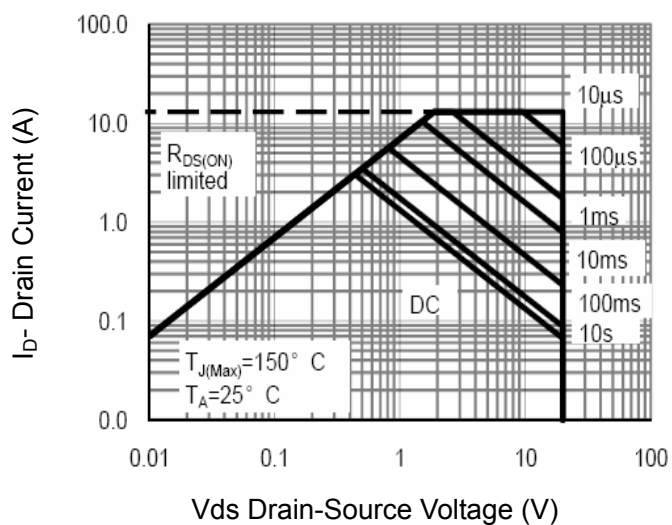


Figure 13 Safe Operation Area

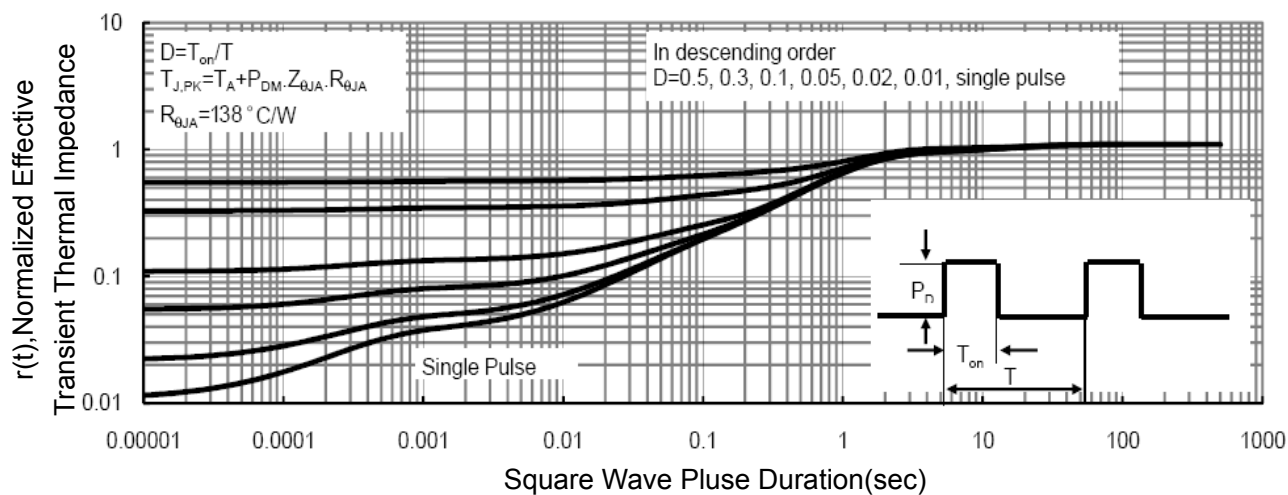
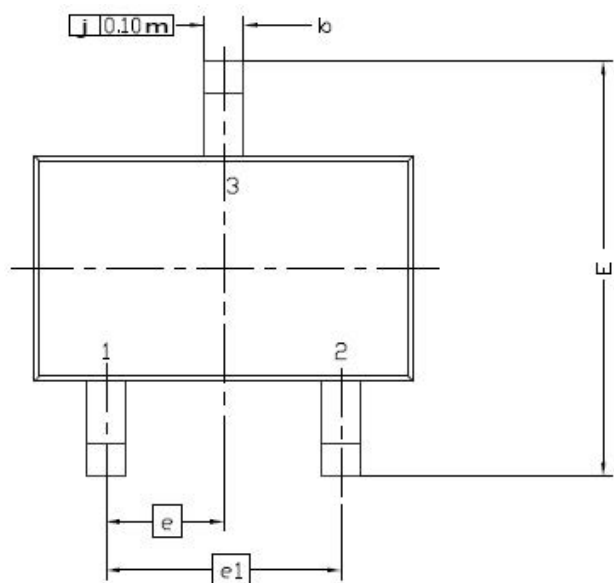


Figure 14 Normalized Maximum Transient Thermal Impedance

SC70-3 Package Information



DIM.	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0,900	0,95	1,10	0,035	0,037	0,043
A1	0,00	---	0,10	0,000	---	0,004
A2	0,70	0,90	1,00	0,028	0,035	0,039
k	0,15	0,22	0,30	0,006	0,016	0,012
c	0,08	0,127	0,20	0,003	0,005	0,008
D	2,10 BSC			0,083 BSC		
E	2,30 BSC			0,091 BSC		
E1	1,30 BSC			0,051 BSC		
e	0,65 BSC			0,026 BSC		
e1	1,30 BSC			0,051 BSC		
L	0,26	0,40	0,46	0,010	0,015	0,018
L2	0,254 BSC			0,010 BSC		
R	0,10	---	---	0,004	---	---
θ	0°	4°	8°	0°	4°	8°
θ1	7° NOM			7° NOM		

