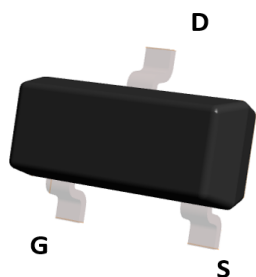
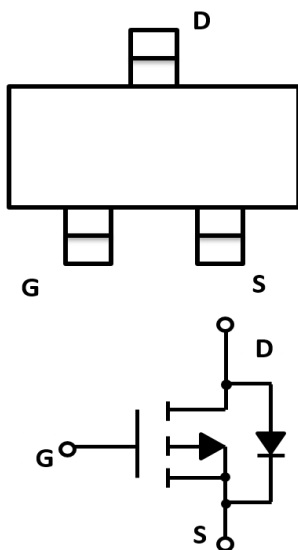


P-Channel Enhancement Mode Field Effect Transistor



Top View

SOT-23


Product Summary

- V_{DS} -60V
- I_D -2.0A
- $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) <215 mohm
- $R_{DS(ON)}$ (at $V_{GS}=-2.5V$) <260 mohm

General Description

- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Applications

- Load switch
- PWM application

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

Parameter	Symbol	Maximum	Unit
Drain-source Voltage	V_{DS}	-60	V
Gate-source Voltage	V_{GS}	± 20	V
Drain Current	I_D	-2.0	A
Pulsed Drain Current ^A	I_{DM}	-8	A
Total Power Dissipation @ $T_A=25^{\circ}C$	P_D	1.4	W
Thermal Resistance Junction-to-Ambient ^B	$R_{\theta JA}$	90	$^{\circ}C/W$
Junction and Storage Temperature Range	T_J, T_{STG}	-55~+150	$^{\circ}C$

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
HAS60P02	N3	N9	3000	45000	180000	7" reel

■ Electrical Characteristics (T_j=25℃ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D =-250μA	-60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-48V, V _{GS} =0V, T _C =25℃			-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} =0V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =-250μA	-1.0	-1.75	-2.5	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = -10.0V, I _D =-1.5A		160	215	mΩ
		V _{GS} = -4.5V, I _D =-1.0A		195	260	
Diode Forward Voltage	V _{SD}	I _S =-2.0A, V _{GS} =0V		-0.8	-1.2	V
Maximum Body-Diode Continuous Current	I _S				-2.0	A
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =-15V, V _{GS} =0V, f=1MHZ		531		pF
Output Capacitance	C _{oss}			59		
Reverse Transfer Capacitance	C _{rss}			38		
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =-4.5V, V _{DS} =-20V, I _D =-1.5A		4.6		nC
Gate Source Charge	Q _{gs}			1.4		
Gate Drain Charge	Q _{gd}			1.62		
Turn-on Delay Time	t _{D(on)}	V _{GS} =-10V, V _{DS} =-15V, I _D =-1A, R _{GEN} =3.3Ω		17.4		ns
Turn-on Rise Time	t _r			5.4		
Turn-off Delay Time	t _{D(off)}			37.2		
Turn-off Fall Time	t _f			2.4		

A. A.Pulse Test: Pulse Width≤300us,Duty cycle ≤2%.

B. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

■ Typical Performance Characteristics

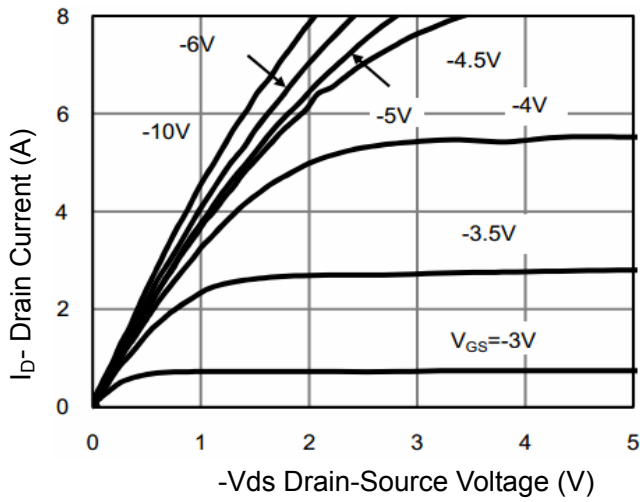


Figure 1 Output Characteristics

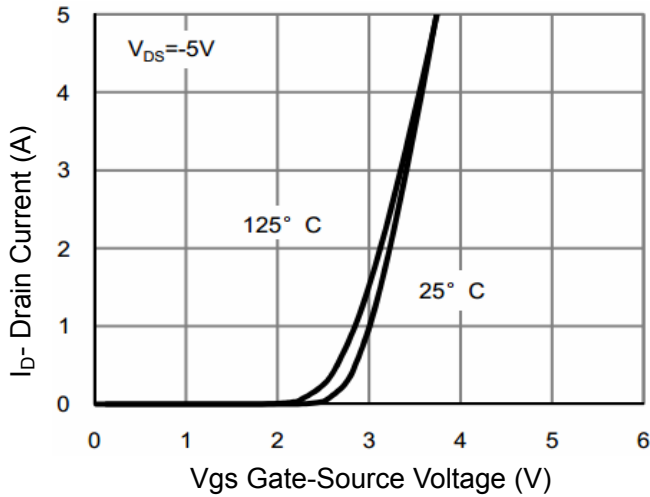


Figure 2 Transfer Characteristics

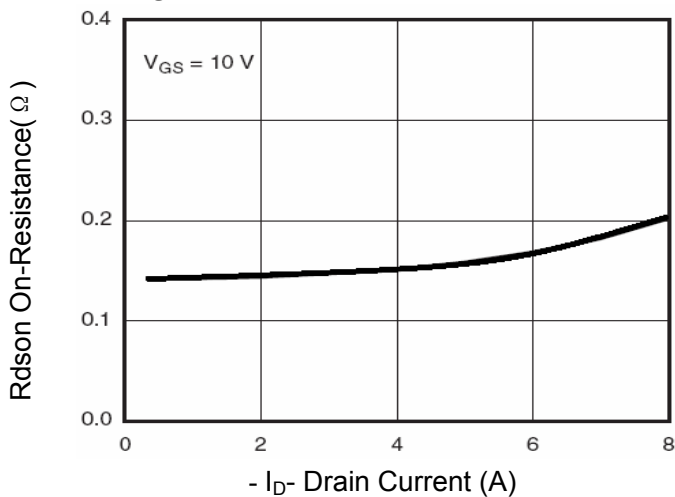


Figure 3 Rdson- Drain Current

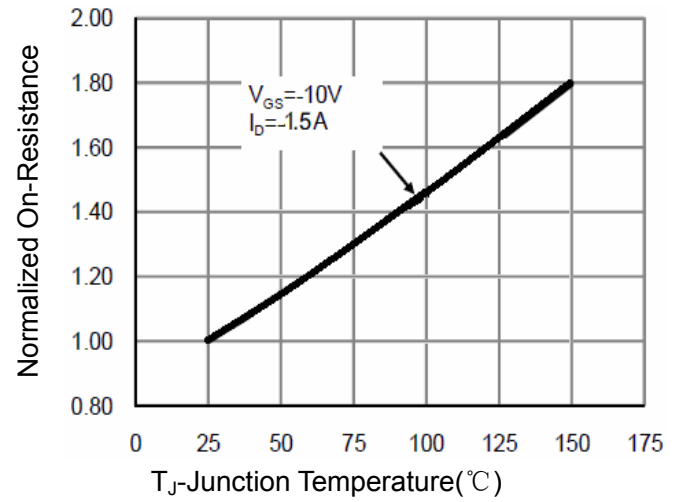


Figure 4 Rdson-Junction Temperature

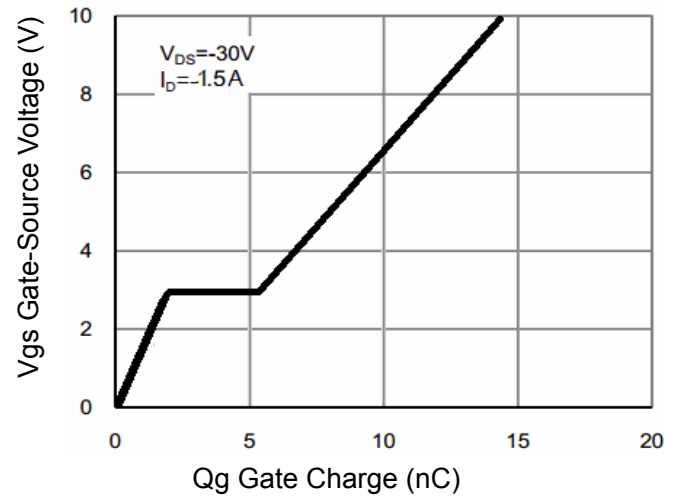


Figure 5 Gate Charge

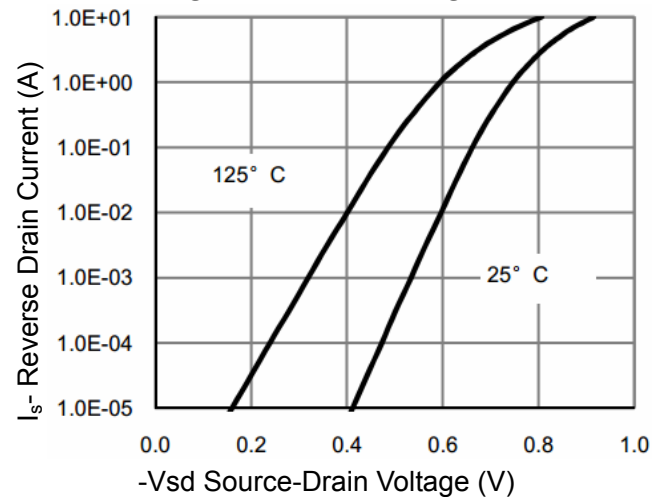
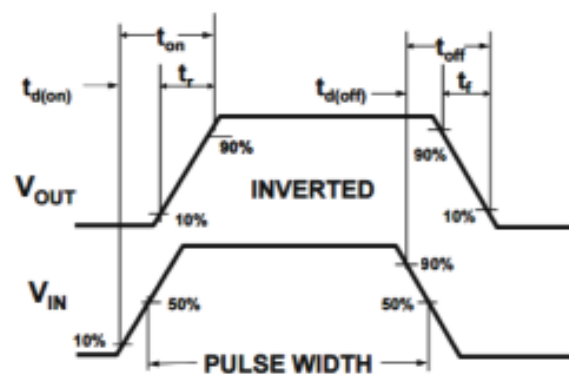
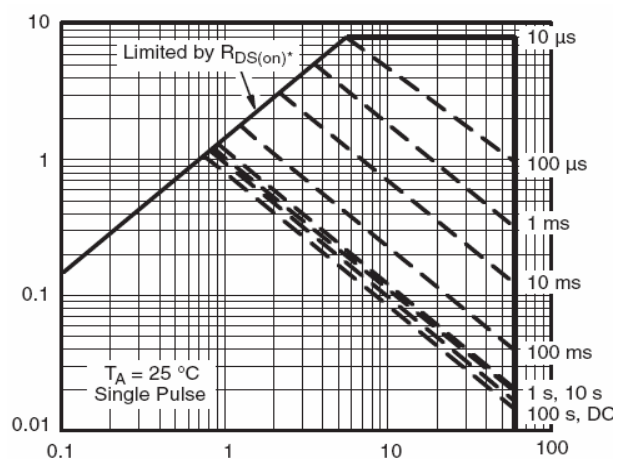
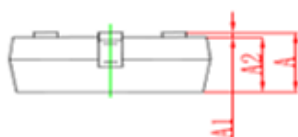
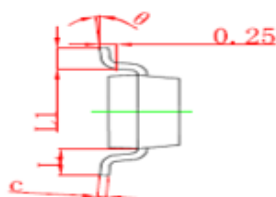
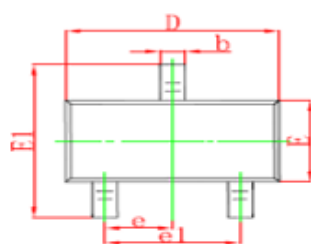


Figure 6 Source- Drain Diode Forward



■ SOT-23 Package information



Symbol	Dimentions in Millimeter		Dimentions in Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950Type		0.037Type	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.220REF	
L1	0.300	0.500	0.012	0.020
θ	0 °	8 °	0 °	8 °

■ SOT-23 Suggested Pad Layout

