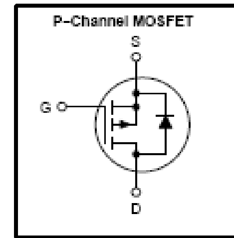
Trench Power MOSFET

−20 V, Single P−Channel, SOT−23

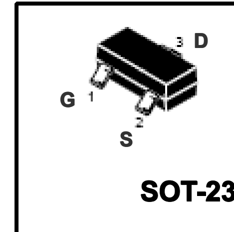


Features

- ■ -3.2A, -20V, $R_{DS(on)}$(Max 85mΩ)@V_{GS}=-4.5V
- ■ −1.8 V Rated for Low Voltage Gate Drive
- ■ SOT-23 Surface Mount for Small Footprint
- ■ Single Pulse Avalanche Energy Rated

General Description

This Power MOSFET is produced using Winsemi's advanced MOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. This devices is specially well suited for Load/Power Management for Portables and Computing, Charging Circuits and Battery Protection



Absolute Maximum Ratings

Symbol	Parameter			Value	Units
V_{DSS}	Drain Source Voltage			-20	V
I_D	Continuous Drain Current(Note 1)	Steady State	Tc=25℃	−2.4	A
			Tc=85℃	-1.7	
		t≤10s	Tc=25℃	-3.2	
P_D	Total Power Dissipation(Note 1)	Steady State	Tc=25℃	0.73	W
		t≤10s		1.25	
I_D	Continuous Drain Current(Note 2)	Steady State	Tc=25℃	-1.8	A
			Tc=85℃	-1.3	
P_D	Total Power Dissipation(Note 2)		Tc=25℃	0.42	W
I_{DM}	Drain Current Pulsed	t=10s		-7.5	A
V_{GS}	Gate to Source Voltage			±8	V
ESD	ESD Capability (Note 3)	C=100pF,R_S = 1500Ω		225	V
$T_{J,}$ T_{stg}	Junction and Storage Temperature			-55~150	℃
T_L	Maximum lead Temperature for soldering purposes			260	℃

Maximum ratings are those values beyond which device damage can occur.Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJA}	Thermal Resistance, Junction-to-Ambient(Note 1)	-	-	170	℃/W
R_{QJA}	Thermal Resistance, Junction-to-Ambient(Note 1)			110	℃/W
R_{QJA}	Thermal Resistance, Junction-to-Ambient(Note 2)			300	℃/W

Note 1: Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)
Note 2: Surface−mounted on FR4 board using the minimum recommended pad size.
Note 3: ESD Rating Information: HBM Class 0

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Electrical Characteristics (Tc = 25°C)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current(Note 4)		I_{GSS}	V_{GS} = ±8 V, V_{DS} = 0 V	-	-	±100	nA
Drain cut−off current(Note 4)		I_{DSS}	V_{DS} = -16 V, V_{GS} = 0 V	-	-	-1	μA
Drain−source breakdown voltage		$V_{(BR)DSS}$	I_D = -250 μA, V_{GS} = 0 V	-20	-	-	V
Gate threshold voltage		$V_{GS(th)}$	V_{DS} = V_{DS} I_D =-250 μA	-0.40	-0.72	-1.5	V
Drain−source ON resistance		$R_{DS(ON)}$	VGS = −4.5 V, ID = −1.6 A	-	70	85	mΩ
			VGS = −2.5 V, ID = −1.3 A		90	120	
			VGS = −1.8 V, ID = −0.9 A		112	200	
Forward Transconductance		gfs	VDS = −5.0 V, ID = −2.3 A	-	75	-	S
Input capacitance		C_{iss}	V_{DS} = -10 V,	-	675	-	pF
Reverse transfer capacitance		C_{rss}	V_{GS} = 0 V,	-	75	-	
Output capacitance		C_{oss}	f = 1 MHz	-	100	-	
Switching time (Note 5)	Rise time	tr	V_{GS} = −4.5 V,	-	12.6	-	ns
	Turn−on time	ton	V_{DS} = −10 V,	-	7.5	-	
	Fall time	tf	I_D = −1.6 A,	-	21.0	-	
	Turn−off time	toff	R_G = 6.0 Ω	-	30.2	-	
Total gate charge (gate−source plus gate−drain)		Qg	V_{GS} = −4.5 V, V_{DS} = −10 V,	-	7.5	8.5	nC
Gate−source charge		Qgs	I_D = −1.6 A	-	1.2	-	
Gate−drain (“miller”) Charge		Qgd		-	2.2	-	
Reverse Recovery Charge		R_G		-	6.5	-	Ω

Source−Drain Ratings and Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	-2.4	A
Pulse drain reverse current	I_{DRP}	-	-	-	-7.5	A
Forward voltage (diode)	V_{DSF}	I_{DR} = -2.4A, V_{GS} = 0 V	-	-0.82	-1.2	V
Reverse recovery time	t_{rr}	I_{DR} = -2.4A, V_{GS} = 0 V, dI_{DR} / dt = 100 A / μs	-	12.8	15	ns
Charge Time	t_a			9.9		ns
Discharge Time	t_b			3.0		ns
Reverse recovery charge	Q_{rr}		-	1008	-	μC

Note 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle 3 2%.

Note 5: Switching characteristics are independent of operating junction temperature.

This transistor is an electrostatic sensitive device
Please handle with caution

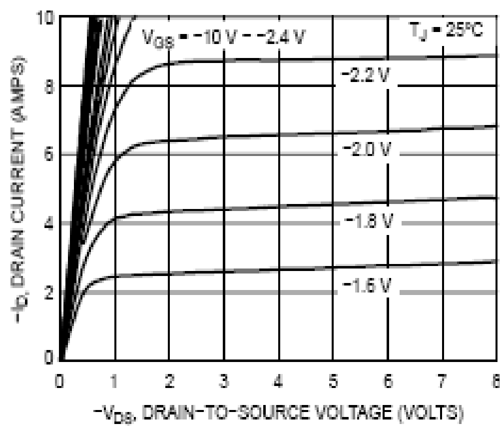

Fig. 1 On-State Characteristics

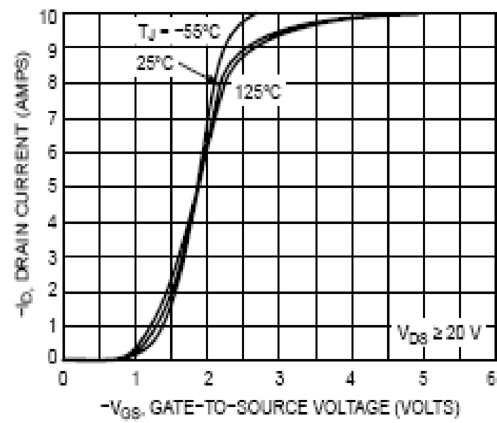

Fig.2 Transfer Current Characteristics

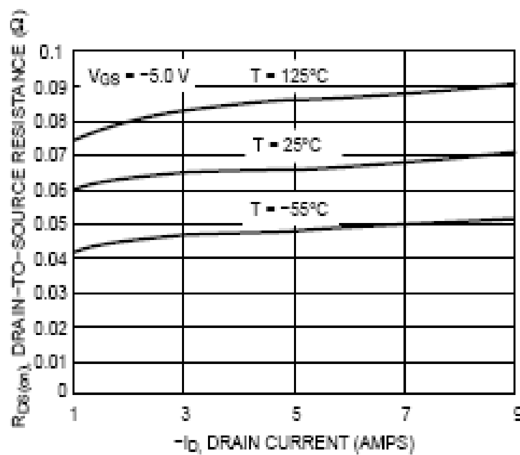

Fig.3 On−Resistance vs. Drain Current and Temperature

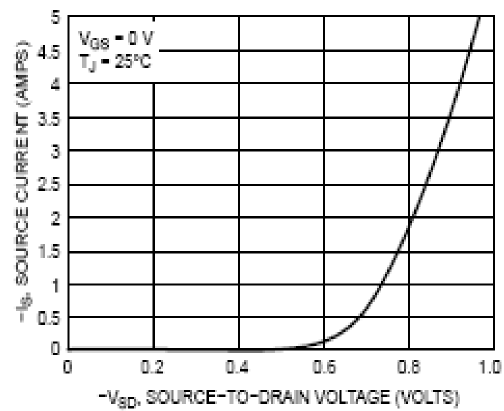

Fig.4 Diode Forward Voltage vs. Current

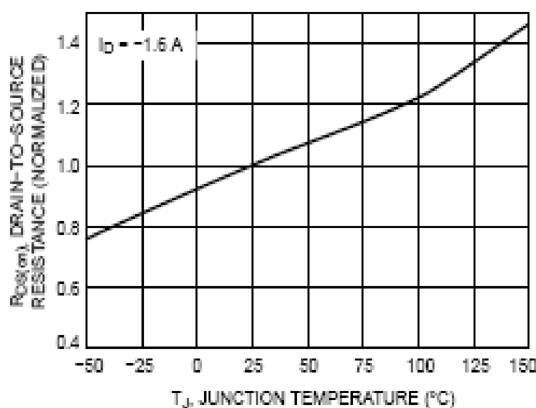

Fig.5 On-Resistance Variation vs Junction Temperature

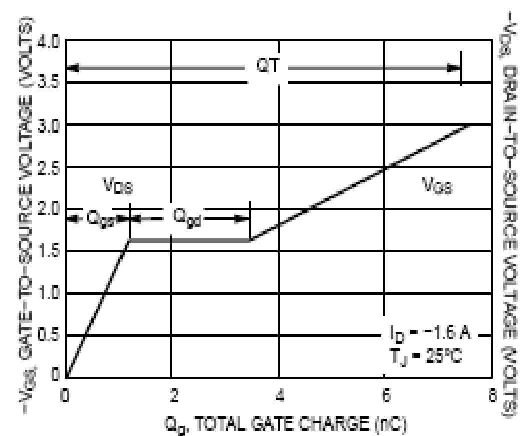

Fig.6 Gate Charge Characteristics

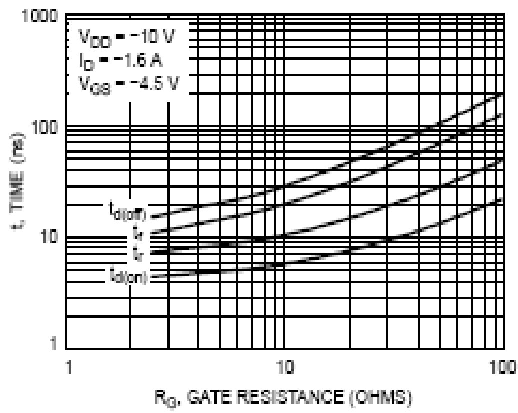

Fig.7 Resistive Switching Time Variation vs. Gate Resistance

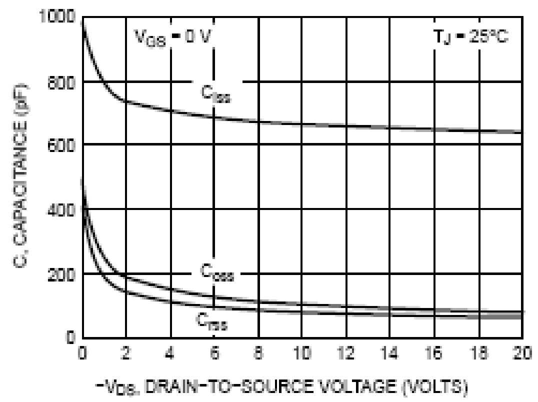

Fig.8 Maximum Drain Current vs Case Temperature

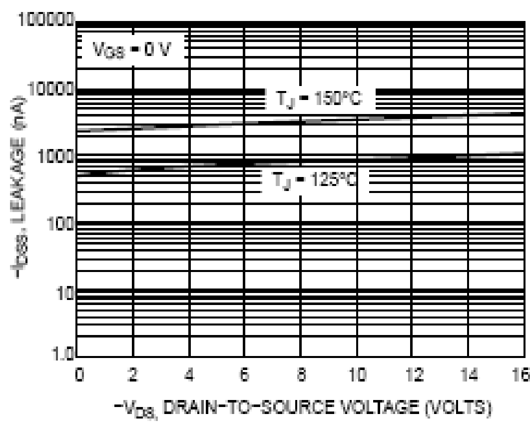

Fig.9 Drain−to−Source Leakage Current vs. Voltage

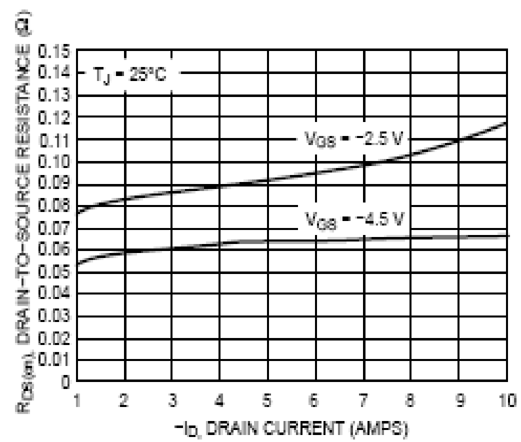

Fig.10 On−Resistance vs. Drain Current and Temperature

SOT-23 Package Dimension