

20V Single P-Channel Enhancement-Mode MOSFET

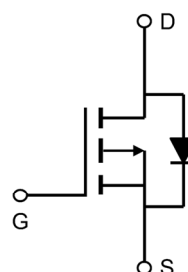
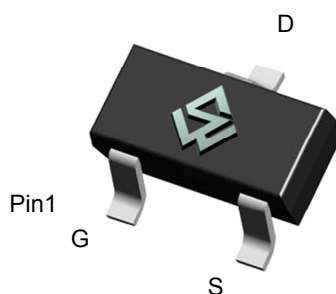
General Description

- Low gate charge.
- Use as a load switch.
- Use in PWM applications

Product Summary

- BV_{DSS} -20V
- $R_{DS(on)}$ @ $V_{GS} = -4.5V$ < 90m Ω
- $R_{DS(on)}$ @ $V_{GS} = -2.5V$ < 120m Ω

SOT-23



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 8	V
Drain Current ($T_A=25^\circ\text{C}$)	I_D	-2.8	A
Drain Current ($T_A=75^\circ\text{C}$)		-1.8	A
Pulsed Drain Current ^a	I_{DM}	-8	A
Power Dissipation ^b ($T_A=25^\circ\text{C}$)	P_D	1.25	W
Power Dissipation ^b ($T_A=75^\circ\text{C}$)		0.9	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 ~ +150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Maximum	Units
Junction-to-Ambient ^a ($t \leq 10s$)	$R_{\theta JA}$	100	$^\circ\text{C/W}$
Junction-to-Ambient ^{a,d} (Steady-State)		130	$^\circ\text{C/W}$
Junction-to-Lead (Steady-State)	$R_{\theta JL}$	90	$^\circ\text{C/W}$

Electrical Characteristics (T _A = 25°C unless otherwise noted)						
Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V , I _D = -250uA	-20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V , V _{GS} = 0V			-1	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±8V, V _{DS} = 0V			±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250uA	-0.45		-1.0	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} = -4.5V , I _D = -2.8A			90	mΩ
		V _{GS} = -2.5V , I _D = -1.0A			120	mΩ
g _{FS}	Forward Transconductance	V _{DS} = -4.5V , I _D = -2.8A		16		S
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} = 0V , I _S = -1.0A			-1.3	V
I _S	Maximum Body-Diode Continuous Current				-1.6	A
Dynamic Characteristics						
C _{iSS}	Input Capacitance	V _{DS} = -10V , V _{GS} = 0V f = 1.0MHz		690		pF
C _{oSS}	Output Capacitance			350		pF
C _{rSS}	Reverse Transfer Capacitance			115		pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} = -10V , I _D = -2.8A V _{GS} = -6V		6.8		nC
Q _{gs}	Gate-Source Charge			1.4		nC
Q _{gd}	Gate-Drain Charge			2.6		nC
t _{D(ON)}	Turn-On Delay Time	V _{DD} = -10V , I _D = -1A V _{GS} = -4 V R _{GEN} = -6 ohm		17		ns
t _r	Turn-On Rise Time			48		ns
t _{D(OFF)}	Turn-Off Delay Time			44		ns
t _f	Turn-Off Fall Time			35		ns

- Repetitive rating, Pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$
- The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using $\leq 10\text{s}$ junction-to-ambient thermal resistance.
- The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$. The value in any given application depends on the user's specific board design.
- The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

Typical Electrical and Thermal Characteristics

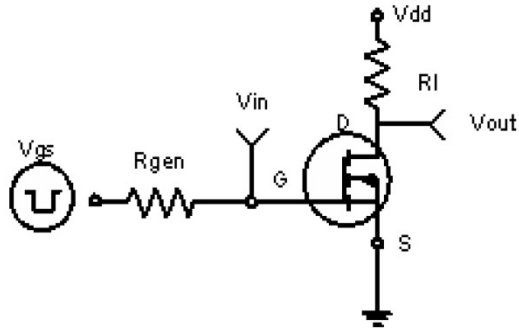


Figure 1: Switching Test Circuit

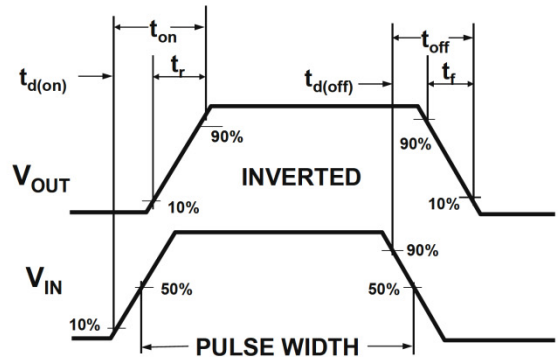


Figure 2: Switching Waveforms

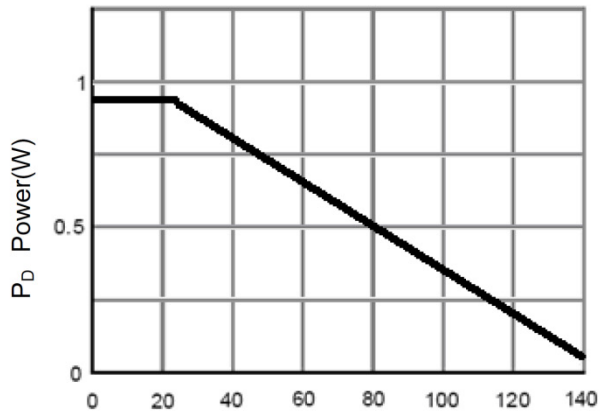


Figure 3 Power Dissipation

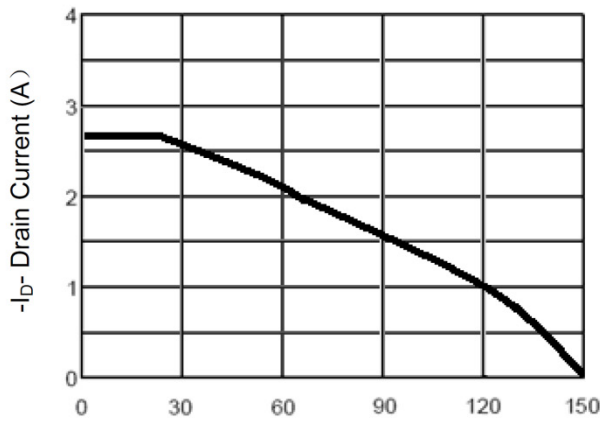


Figure 4 Drain Current

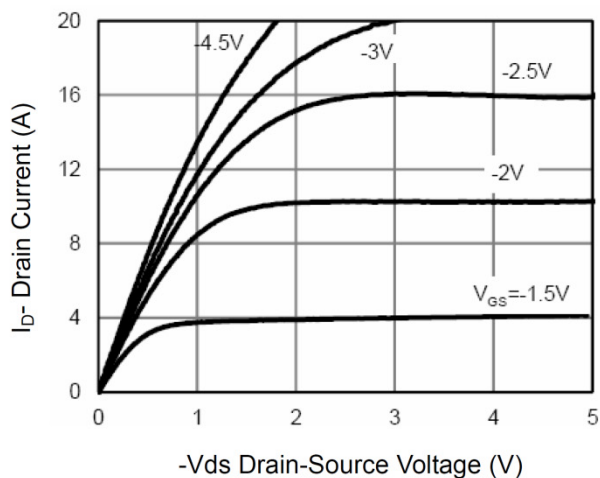


Figure 5 Output Characteristics

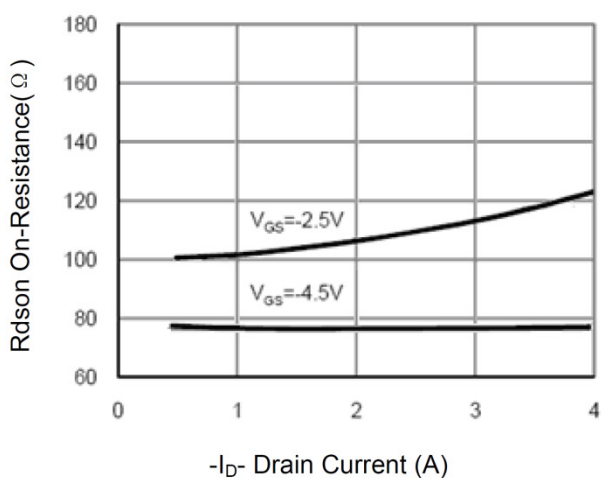


Figure 6 Drain-Source On-Resistance

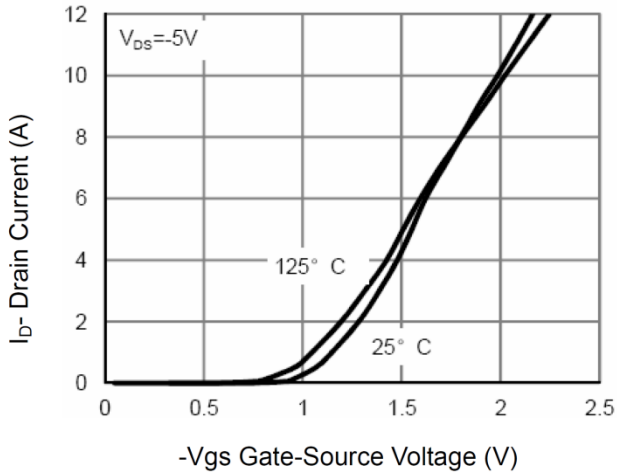


Figure 7 Transfer Characteristics

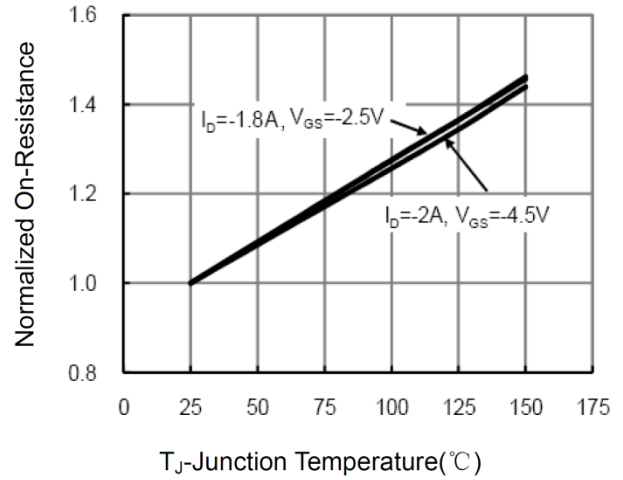


Figure 8 Drain-Source On-Resistance

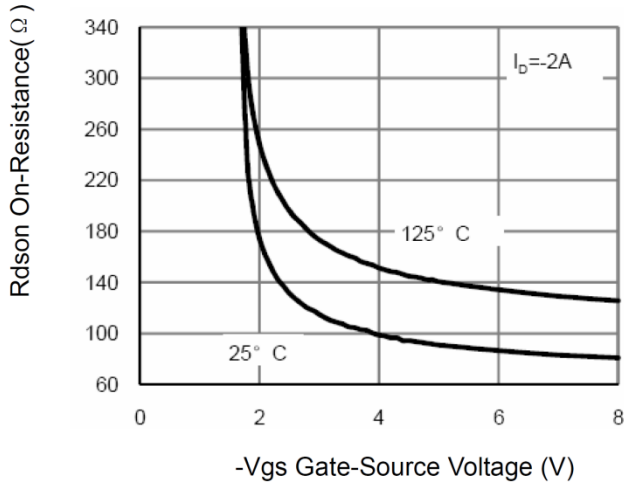


Figure 9 Rdson vs Vgs

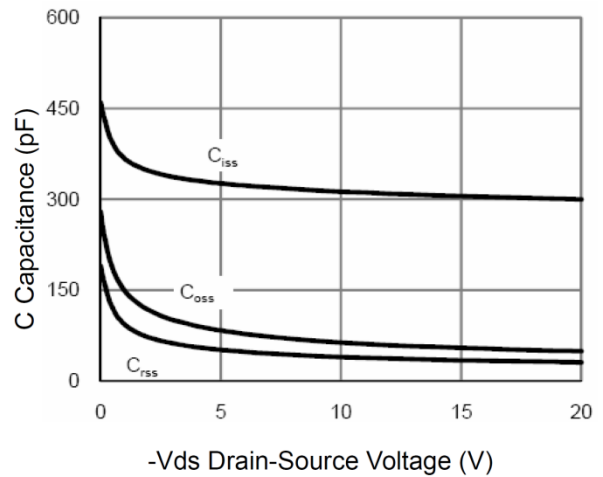


Figure 10 Capacitance vs Vds

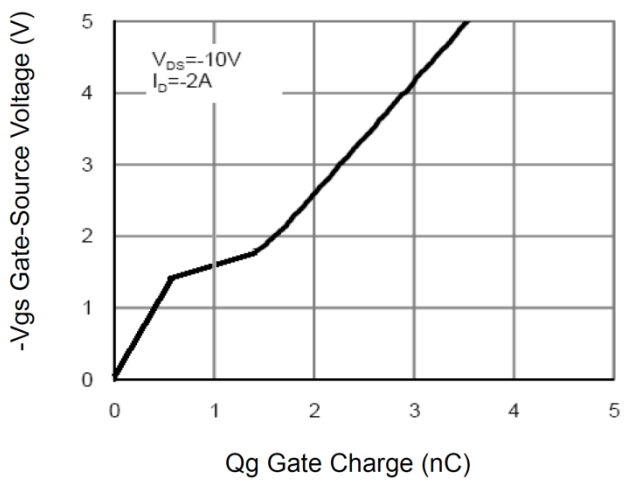


Figure 11 Gate Charge

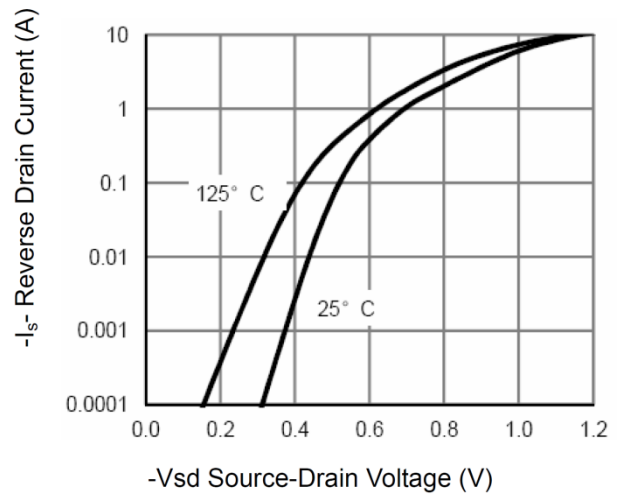


Figure 12 Source-Drain Diode Forward

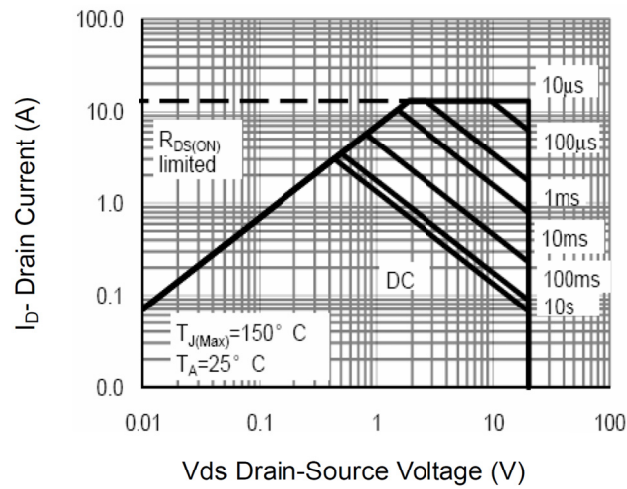


Figure 13 Safe Operation Area

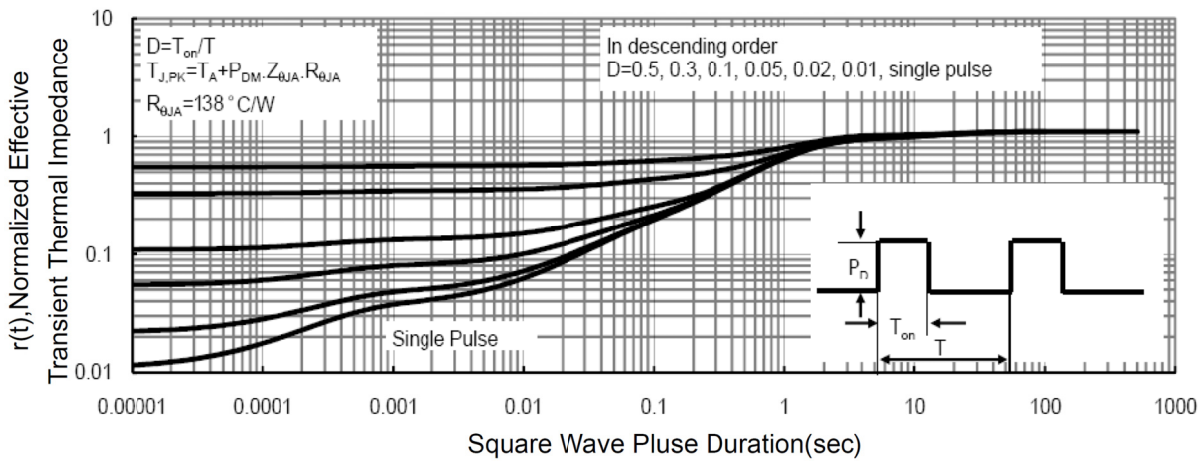


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Outline

