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FQS4901

N-Channel QFET® MOSFET

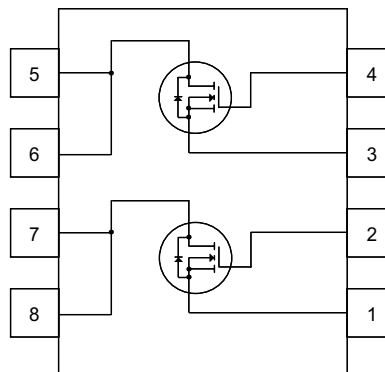
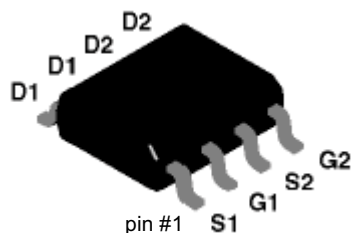
400 V, 0.45 A, 4.2 Ω

Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor®'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.

Features

- 0.45 A, 400 V, $R_{DS(on)}=4.2 \Omega(\text{Max.})@V_{GS}=10 \text{ V}, I_D=0.225 \text{ A}$
- Low Gate Charge (Typ. 5.8 nC)
- Low C_{rss} (Typ. 5 pF)
- 100% Avalanche Tested



Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	FQS4901	Unit
V _{DSS}	Drain-Source Voltage	400	V
I _D	Drain Current - Continuous (T _A = 25°C)	0.45	A
	- Continuous (T _A = 70°C)	0.285	A
I _{DM}	Drain Current - Pulsed (Note 1)	1.8	A
V _{GSS}	Gate-Source Voltage	± 25	V
dv/dt	Peak Diode Recovery dv/dt (Note 2)	4.5	V/ns
P _D	Power Dissipation (T _A = 25°C)	2.0	W
	(T _A = 70°C)	1.3	W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
R _{θJA}	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/W

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	400	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.42	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 320\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 25\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -25\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 0.225\text{ A}$	--	3.2	4.2	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 35\text{ V}, I_D = 0.225\text{ A}$ (Note 3)	--	0.283	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	160	210	pF
C_{oss}	Output Capacitance		--	30	40	pF
C_{rss}	Reverse Transfer Capacitance		--	5	6.5	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 200\text{ V}, I_D = 0.45\text{ A},$ $R_G = 25\text{ }\Omega$ (Note 3,4)	--	5	20	ns
t_r	Turn-On Rise Time		--	20	50	ns
$t_{d(off)}$	Turn-Off Delay Time		--	20	50	ns
t_f	Turn-Off Fall Time		--	35	80	ns
Q_g	Total Gate Charge	$V_{DS} = 320\text{ V}, I_D = 0.45\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 3,4)	--	5.8	7.5	nC
Q_{gs}	Gate-Source Charge		--	0.53	--	nC
Q_{gd}	Gate-Drain Charge		--	3.22	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	0.45	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	1.8	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 0.45 A	--	--	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 0.45 A, dI _F / dt = 100 A/μs (Note 3)	--	86	--	ns
Q _{rr}	Reverse Recovery Charge		--	0.15	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{SD} \leq 0.45\text{ A}, dI/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Characteristics

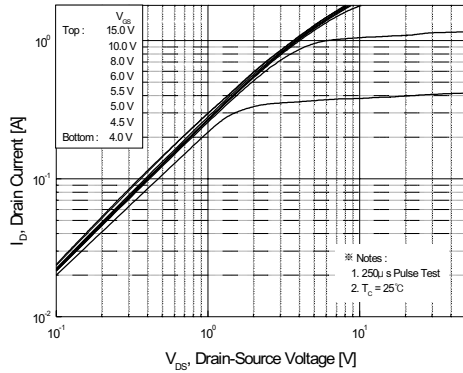


Figure 1. On-Region Characteristics

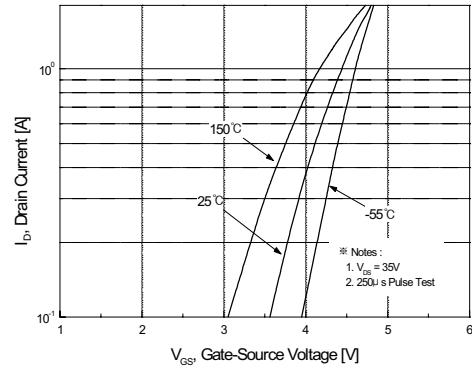


Figure 2. Transfer Characteristics

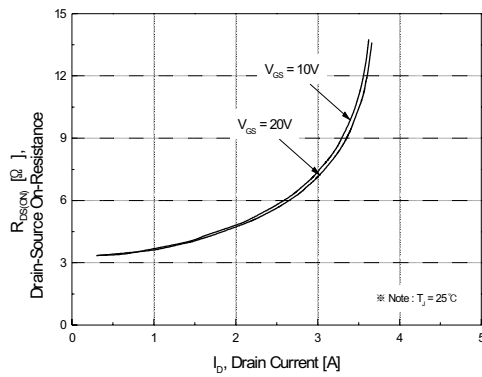


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

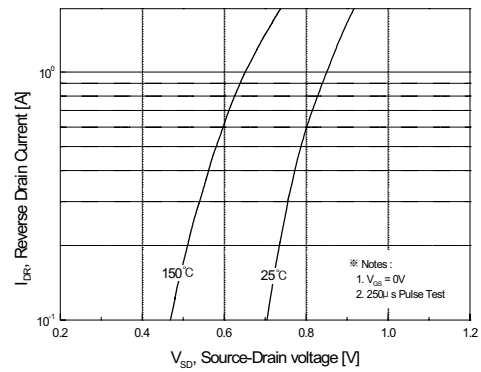


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

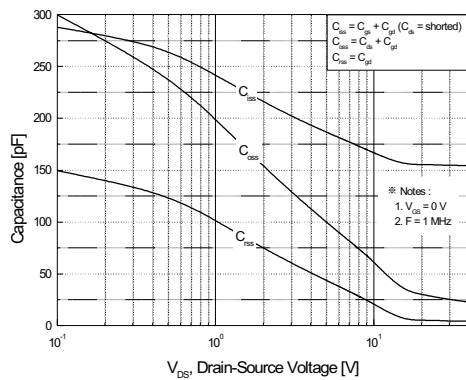


Figure 5. Capacitance Characteristics

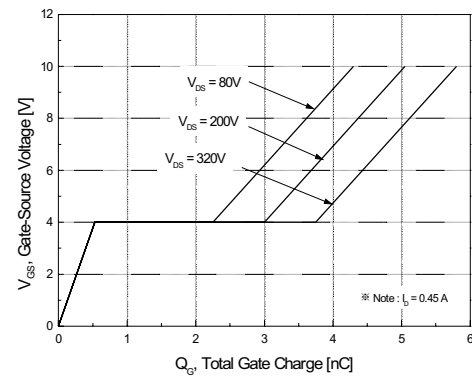


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

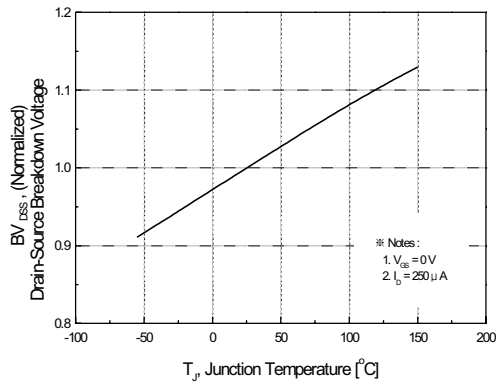


Figure 7. Breakdown Voltage Variation vs. Temperature

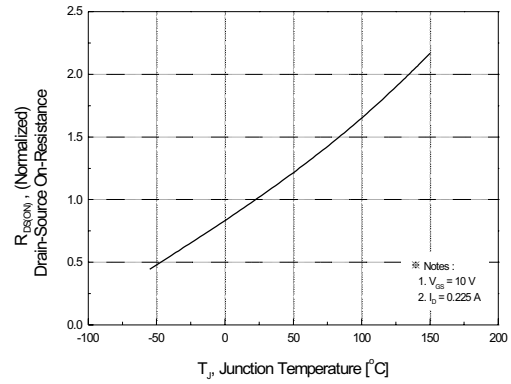


Figure 8. On-Resistance Variation vs. Temperature

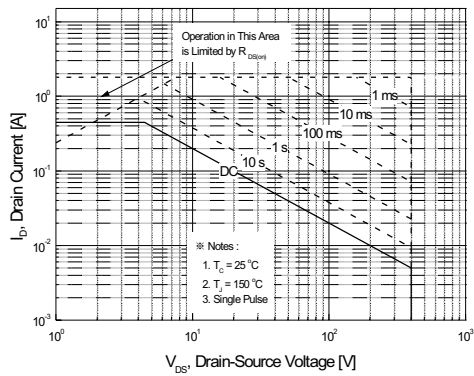


Figure 9. Maximum Safe Operating Area

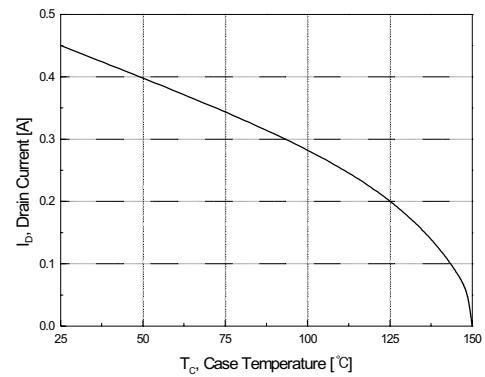


Figure 10. Maximum Drain Current vs. Case Temperature

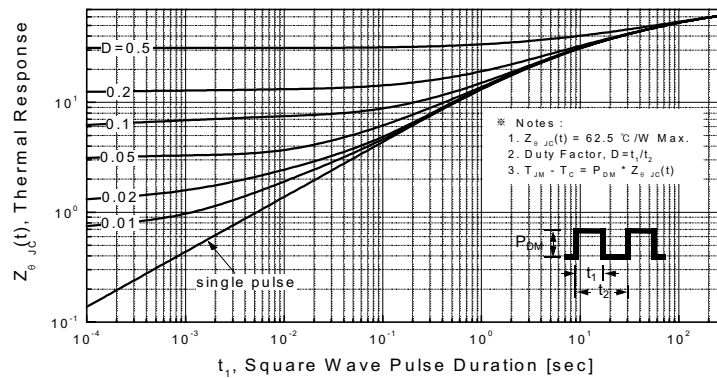
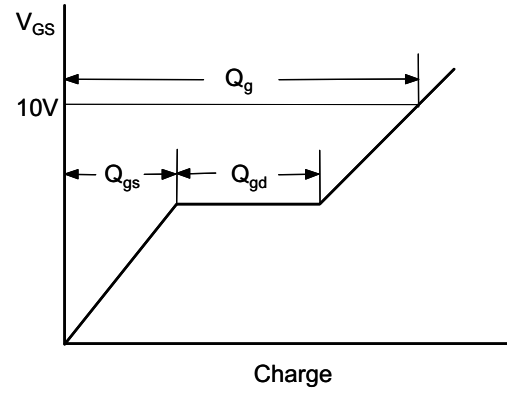
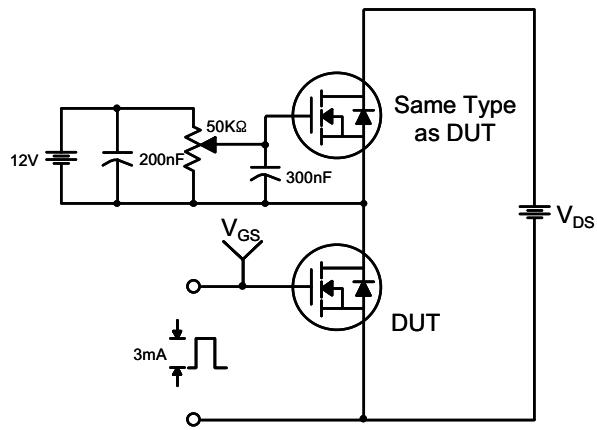
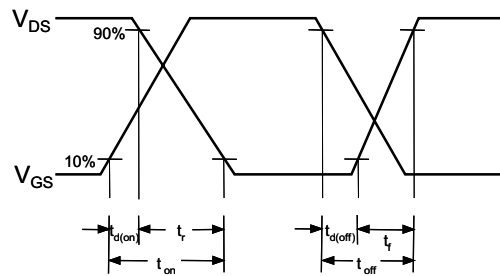
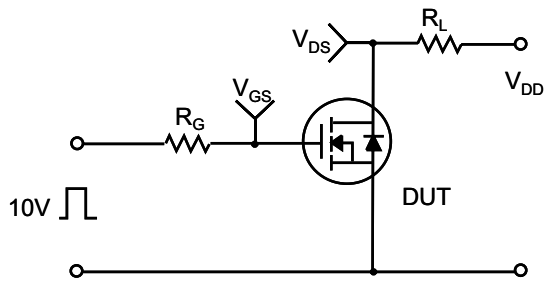


Figure 11. Transient Thermal Response Curve

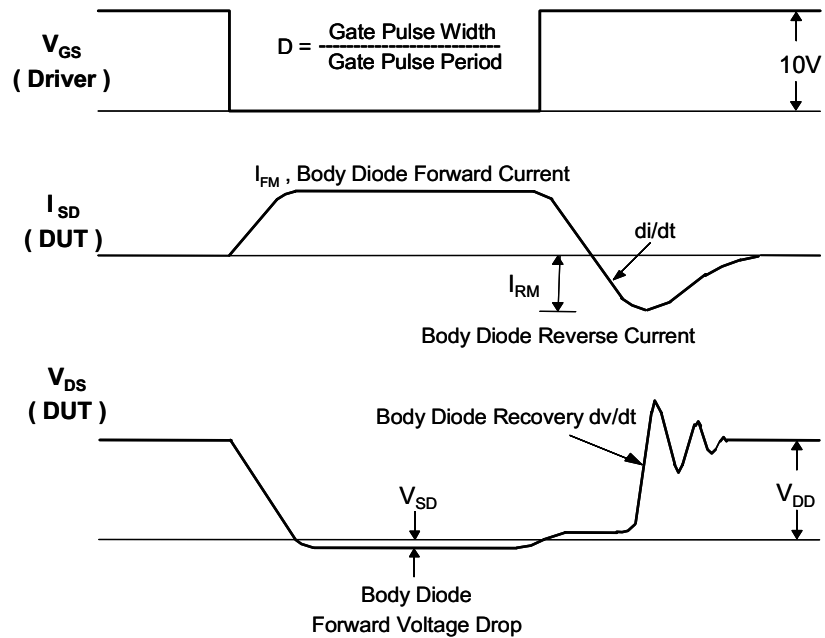
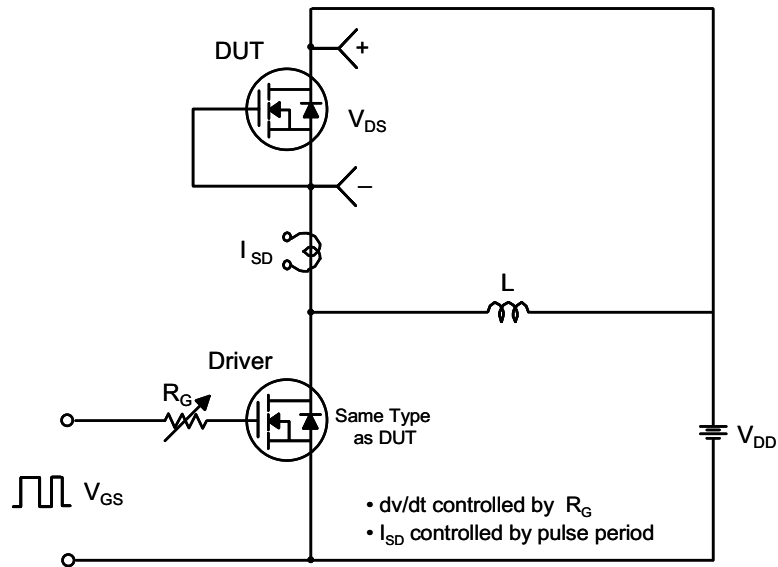
Gate Charge Test Circuit & Waveform



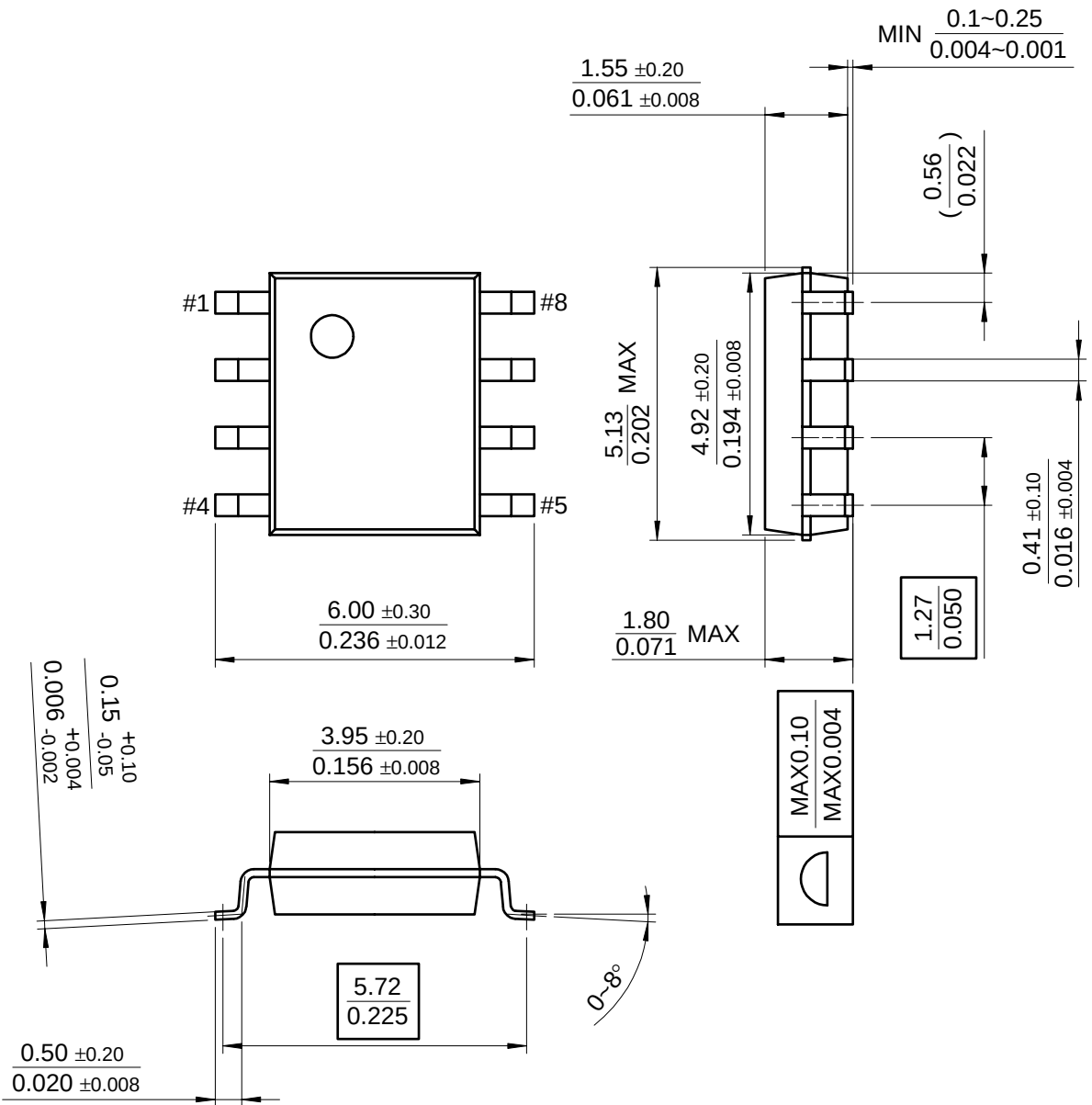
Resistive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



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