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November 2013

FDS8958B

Dual N & P-Channel PowerTrench[®] MOSFET Q1-N-Channel: 30 V, 6.4 A, 26 m Ω Q2-P-Channel: -30 V, -4.5 A, 51 m Ω

Features

Q1: N-Channel

- Max r_{DS(on)} = 26 mΩ at V_{GS} = 10 V, I_D = 6.4 A
- Max r_{DS(on)} = 39 mΩ at V_{GS} = 4.5 V, I_D = 5.2 A

Q2: P-Channel

- Max r_{DS(on)} = 51 mΩ at V_{GS} = -10 V, I_D = -4.5 A
- Max r_{DS(on)} = 80 mΩ at V_{GS} = -4.5 V, I_D = -3.3 A
- HBM ESD protection level > 3.5 kV (Note 3)

RoHS Compliant



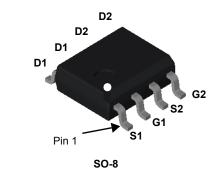
General Description

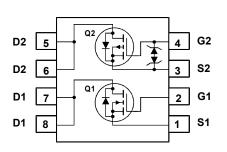
These dual N- and P-Channel enhancement mode power field effect transistors are produced using Fairchild Semiconductor's advanced PowerTrench[®] process that has been especially tailored to minimize on-state resistan ce and yet maintain superior switching performance.

These devices are well suite d for low voltage and battery powered applications where low in-line power loss and fast switching are required.

Application

- DC-DC Conversion
- BLU and motor drive inverter





MOSFET Maximum Ratings T_C = 25 °C unless otherwise noted

Symbol	Parameter			Q1	Q2	Units
V _{DS}	Drain to Source Voltage			30	-30	V
V _{GS}	Gate to Source Voltage			±20	±25	V
1	Drain Current - Continuous T _A = 25 °C			6.4	-4.5	٨
D	- Pulsed			30	-30	- A
	Power Dissipation for Dual Operation			2	.0	
P _D	Power Dissipation for Single Operation	T _A = 25 °C	(Note 1a)	1	.6	W
		T _A = 25 °C	(Note 1b)	0	.9	
E _{AS}	Single Pulse Avalanche Energy		(Note 4)	18	5	mJ
T _J , T _{STG}	Operating and Storage Junction Temperature Range			-55 to	+150	°C

Thermal Characteristics

$R_{ ext{ heta}JC}$	Thermal Resistance, Junction to Case	(Note 1)	40	°C/W
R_{\thetaJA}	Thermal Resistance, Junction to Ambient	(Note 1a)	78	0/10

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDS8958B	FDS8958B	SO-8	13 "	12 mm	2500 units

Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Off Chara	acteristics						
BV _{DSS}	Drain to Source Breakdown Voltage	I_D = 250 µA, V _{GS} = 0 V I_D = -250 µA, V _{GS} = 0 V	Q1 Q2	30 -30			V
ΔΒV _{DS} S ΔT _J	Breakdown Voltage Temperature Coefficient	$I_D = 250 \ \mu$ A, referenced to 25 °C $I_D = -250 \ \mu$ A, referenced to 25 °C	Q1 Q2		24 -21		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24 V, V_{GS} = 0 V$ $V_{DS} = -24 V, V_{GS} = 0 V$	Q1 Q2			1 -1	μA
I _{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 V, V_{DS} = 0 V$ $V_{GS} = \pm 25 V, V_{DS} = 0 V$	Q1 Q2			±100 ±10	nA μA
On Chara	cteristics						
V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \ \mu A$ $V_{GS} = V_{DS}, I_D = -250 \ \mu A$	Q1 Q2	1.0 -1.0	2.0 -1.9	3.0 -3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C I_D = -250 μ A, referenced to 25 °C	Q1 Q2		-6 5		mV/°C
_	Chatia Ducia ta Causao On Daciatanao	$V_{GS} = 10 \text{ V}, I_D = 6.4 \text{ A}$ $V_{GS} = 4.5 \text{ V}, I_D = 5.2 \text{ A}$ $V_{GS} = 10 \text{ V}, I_D = 6.4 \text{ A}, T_J = 125 ^{\circ}\text{C}$	Q1		21 29 31	26 39 39	
r _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = -10 V$, $I_D = -4.5 A$ $V_{GS} = -4.5 V$, $I_D = -3.3 A$ $V_{GS} = -10 V$, $I_D = -4.5 A$, $T_J = 125 °C$	Q2		38 60 53	51 80 72	mΩ
9 _{FS}	Forward Transconductance	$V_{DD} = 5 V$, $I_D = 6.4 A$ $V_{DD} = -5 V$, $I_D = -4.5 A$	Q1 Q2		20 10		S
Dynamic	Characteristics						
C _{iss}	Input Capacitance	Q1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHZ	Q1 Q2		405 570	540 760	pF
~			Q1		75	100	_

C _{iss}	Input Capacitance	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHZ	Q2	570	760	р⊢
C _{oss}	Output Capacitance		Q1	75	100	рF
COSS		Q2	Q2	115	155	μ.
0	Deverse Transfer Canaditanee	V _{DS} = -15 V, V _{GS} = 0 V, f = 1 MHZ	Q1	55	80	рF
C _{rss}	Reverse Transfer Capacitance		Q2	100	150	ρг
D	Gate Resistance		Q1	2.4		Ω
R _g			Q2	4.4		52

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	Q1	Q1 Q2	4.3 6.0	10 12	ns
t _r	Rise Time	V _{DD} = 15 V, I _D = 6.4 A, V _{GS} = 10 V, R _{GEN} = 6 Ω	Q1 Q2	2.0 6.0	10 12	ns
t _{d(off)}	Turn-Off Delay Time	Q2 V _{DD} = -15 V, I _D = -4.5 A,	Q1 Q2	12 17	22 30	ns
t _f	Fall Time	$V_{GS} = -10 \text{ V}, \text{ R}_{GEN} = 6 \Omega$	Q1 Q2	2.0 7.0	10 14	ns
Q _{g(TOT)}	Total Gate Charge	V _{GS} = 10 V V _{GS} = -10 V Q1	Q1 Q2	8.3 14	12 19	nC
Q _{g(TOT)}	Total Gate Charge	$\begin{array}{c} & & \\ & & \\ V_{GS} = 4.5 \text{ V} \\ & V_{GS} = -4.5 \text{ V} \end{array} V_{DD} = 15 \text{ V} \\ & I_{D} = 6.4 \text{ A} \end{array}$	(, Q1 Q2	4.1 7.0	5.8 9.6	nC
Q _{gs}	Gate to Source Charge	Q2 V _{DD} = -15 V	Q1 Q2	1.3 1.9		nC
Q _{gd}	Gate to Drain "Miller" Charge	$I_{\rm D} = -4.5 \rm{A}$	Q1 Q2	1.7 3.6		nC

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ר [®] MOSFET	

Electrical Characteristics T _J = 25 °C unless otherwise noted							
Symbol	Parameter	Test Conditions	Туре	Min	Тур	Max	Units
Drain-Source Diode Characteristics							
V _{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 V, I_S = 1.3 A$ (Note 2) $V_{GS} = 0 V, I_S = -1.3 A$ (Note 2)			0.8 -0.8	1.2 -1.2	V
t _{rr}	Reverse Recovery Time	Q1 I _F = 6.4 A, di/dt = 100 A/µs	Q1 Q2		17 20	30 36	ns
Q _{rr}	Reverse Recovery Charge	Q2 I _F = -4.5 A, di/dt = 100 A/µs	Q1 Q2		6 8	12 16	nC

NOTES:

1. $R_{0,JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{0,JC}$ is guaranteed by design while R_{0CA} is determined by the user's board design.



a) 78 °C/W when mounted on a 1 in² pad of 2 oz copper



b) 135 °C/W when mounted on a minimun pad

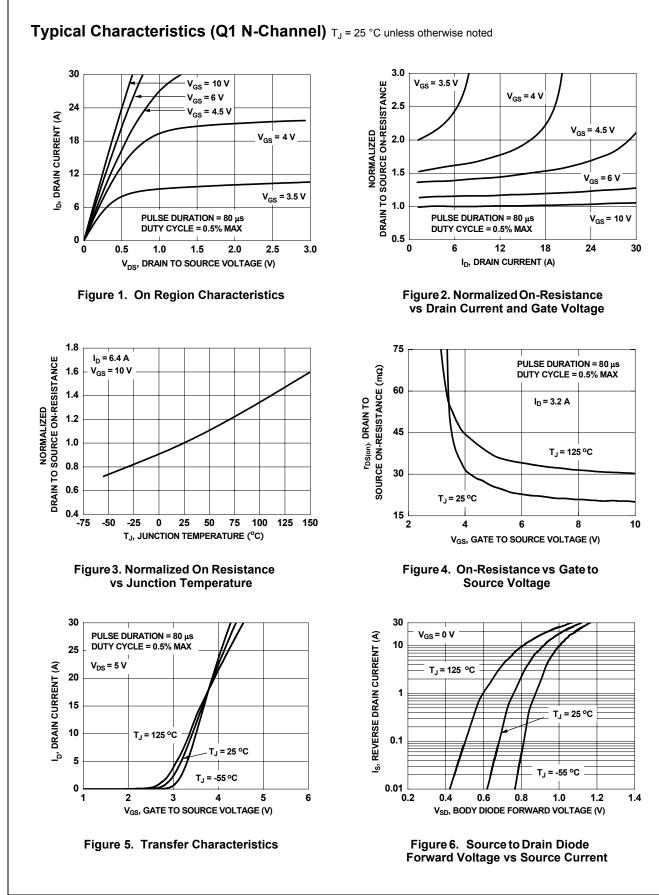
2. Pulse Test: Pulse Width < 300 μ s, Duty cycle < 2.0%.

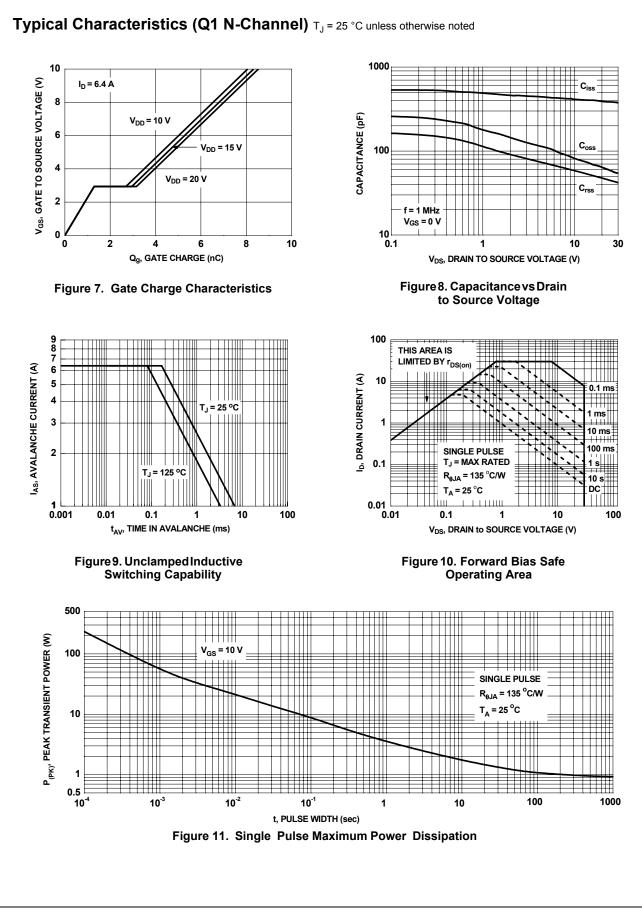
3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

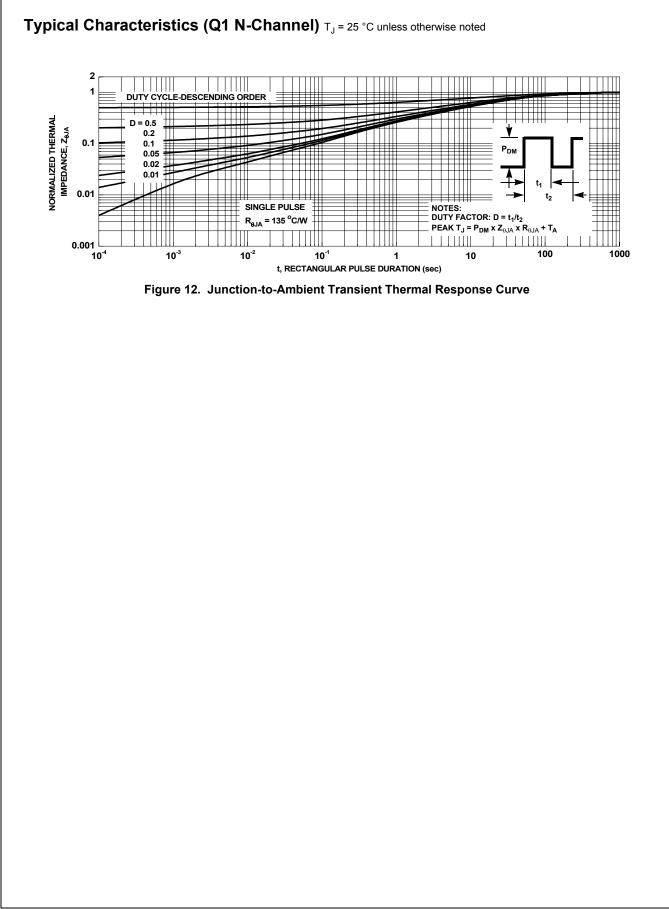
4. UIL condition: Starting T_J = 25 °C, L = 1 mH, I_{AS} = 6 A, V_{DD} = 27 V, V_{GS} = 10 V . (Q1)

Starting T_J = 25 °C, L = 1 mH, I_{AS} = -4 A, V_{DD} = -27 V, V_{GS} = -10 V. (Q2)

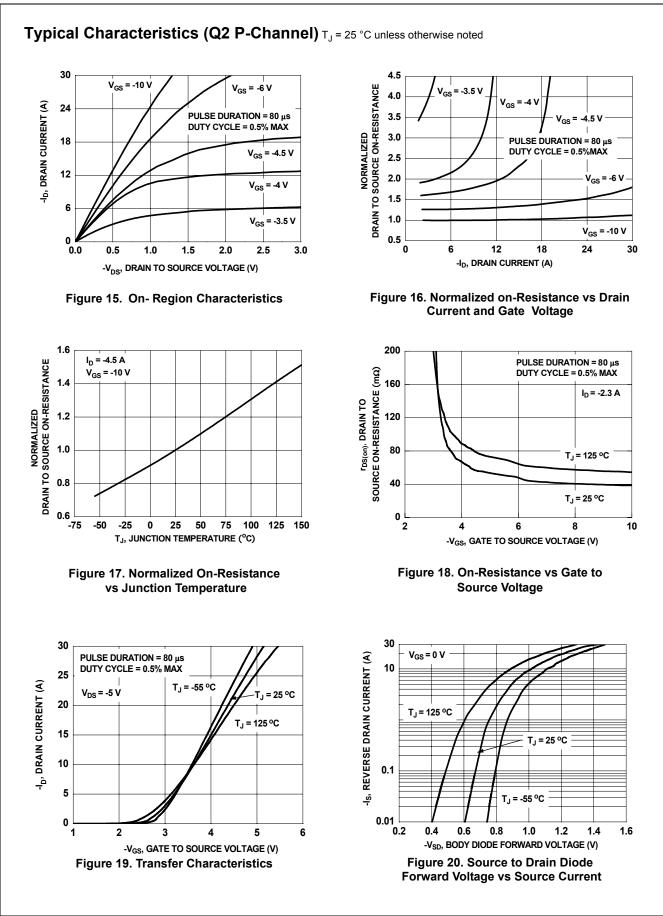
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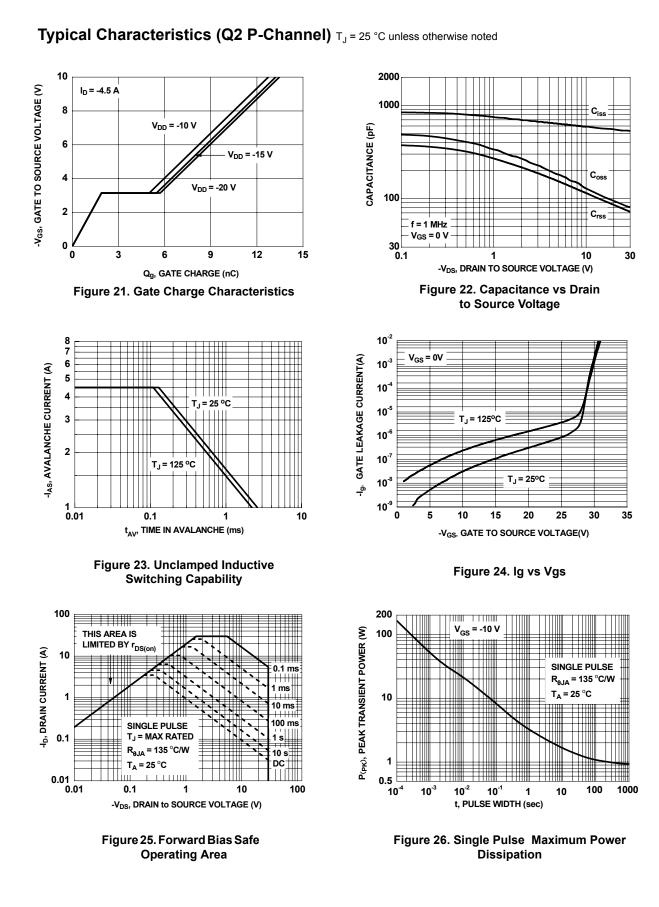


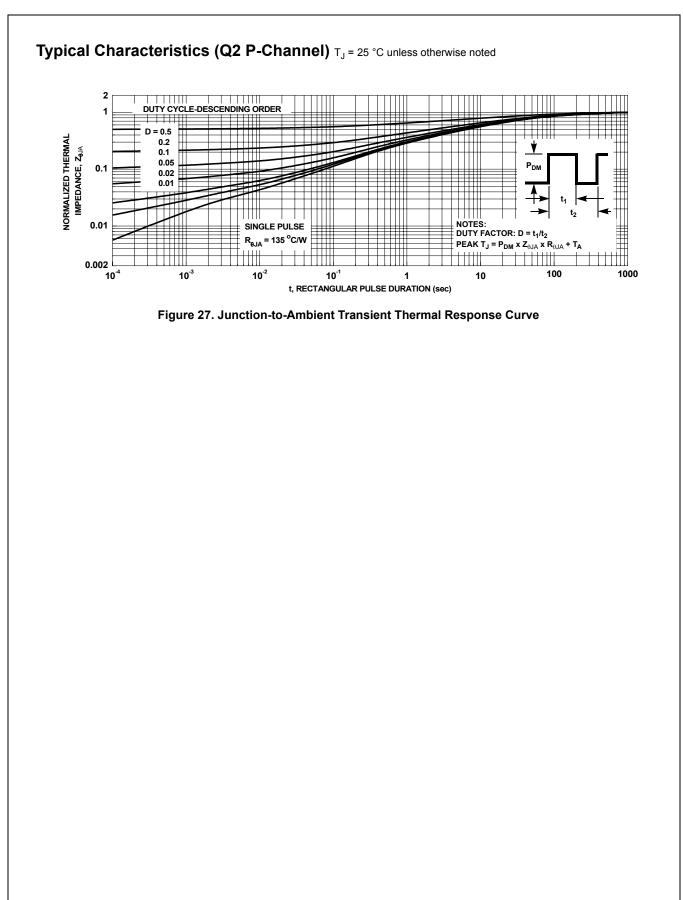






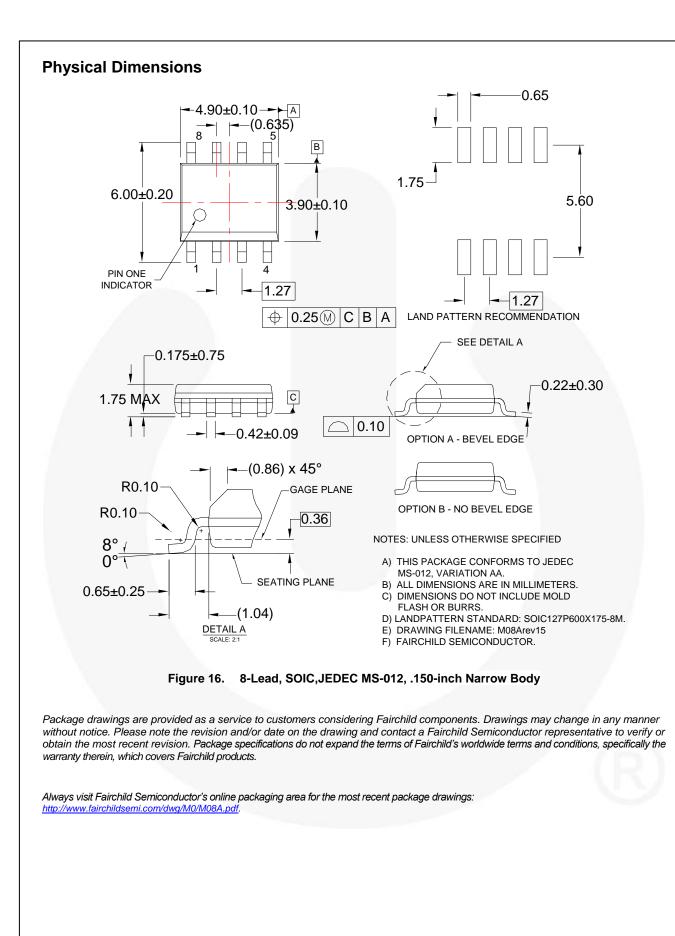






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