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FDMQ86530L

GreenBridge™ Series of High-Efficiency Bridge Rectifiers N-Channel PowerTrench® MOSFET 60 V, 8 A, 17.5 mΩ

Features

- Max $r_{DS(on)}$ = 17.5 mΩ at $V_{GS} = 10$ V, $I_D = 8$ A
- Max $r_{DS(on)}$ = 23 mΩ at $V_{GS} = 6$ V, $I_D = 7$ A
- Max $r_{DS(on)}$ = 25 mΩ at $V_{GS} = 4.5$ V, $I_D = 6.5$ A
- Substantial efficiency benefit in PD solutions
- RoHS Compliant

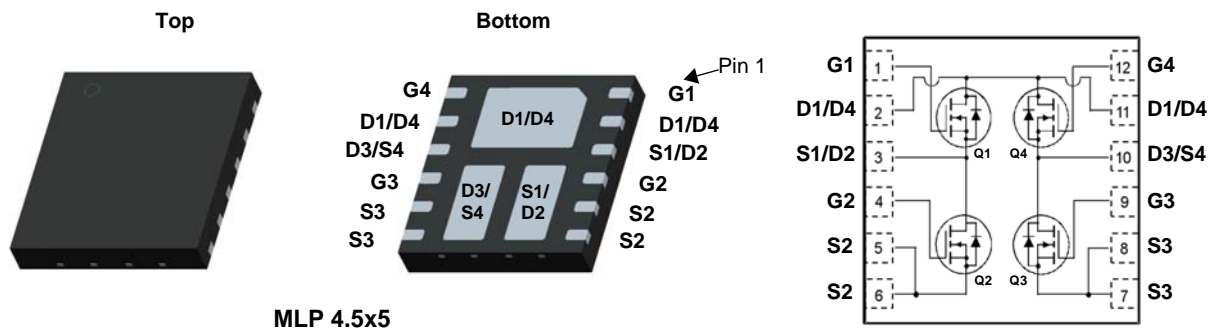


General Description

This Quad MOSFET solution provides ten-fold improvement in power dissipation over diode bridge.

Applications

- Active bridge
- Diode Bridge replacement in 24V & 48V AC systems



MOSFET Maximum Ratings $T_A = 25$ °C unless otherwise noted

Symbol	Parameter	Rated	Units
V_{DS}	Drain to Source Voltage	60	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous	$T_C = 25$ °C	A
	-Continuous	$T_A = 25$ °C (Note 1a)	
	-Pulsed		
P_D	Power Dissipation	$T_C = 25$ °C	W
	Power Dissipation	$T_A = 25$ °C (Note 1a)	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	135	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMQ86530L	FDMQ86530L	MLP 4.5x5	13"	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

V_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	60			V
$\frac{\Delta V_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		27		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}$, $V_{DS} = 0\text{ V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\text{ }\mu\text{A}$	1	1.8	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		-6		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$, $I_D = 8\text{ A}$		12	17.5	m Ω
		$V_{GS} = 6\text{ V}$, $I_D = 7\text{ A}$		15	23	
		$V_{GS} = 4.5\text{ V}$, $I_D = 6.5\text{ A}$		20	25	
		$V_{GS} = 10\text{ V}$, $I_D = 8\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$		18	26	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 8\text{ A}$		28		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		1725	2295	pF
C_{oss}	Output Capacitance			299	400	pF
C_{rss}	Reverse Transfer Capacitance			10	15	pF

Switching Characteristics

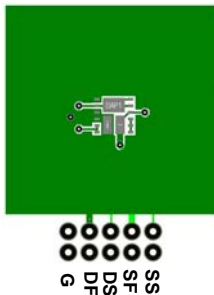
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}$, $I_D = 8\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		8.8	18	ns
t_r	Rise Time			3.8	10	ns
$t_{d(off)}$	Turn-Off Delay Time			22	35	ns
t_f	Fall Time			2.8	10	ns
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V to } 10\text{ V}$	$V_{DD} = 30\text{ V}$, $I_D = 8\text{ A}$	23	33	nC
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V to } 4.5\text{ V}$		11	16	nC
Q_{gs}	Gate to Source Charge			5.1		nC
Q_{gd}	Gate to Drain "Miller" Charge			2.3		nC

Drain-Source Diode Characteristics

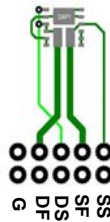
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 8\text{ A}$ (Note 2)		0.8	1.3	V
		$V_{GS} = 0\text{ V}$, $I_S = 1.6\text{ A}$ (Note 2)		0.7	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 8\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		27	43	ns
Q_{rr}	Reverse Recovery Charge			12	22	nC

Notes:

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



a. $65\text{ }^\circ\text{C/W}$ when mounted on a 1 in^2 pad of 2 oz copper. the board designed Q1+Q3 or Q2+Q4.



b. $135\text{ }^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper. the board designed Q1+Q3 or Q2+Q4.

- Pulse Test: Pulse Width < $300\text{ }\mu\text{s}$, Duty cycle < 2.0%.

Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

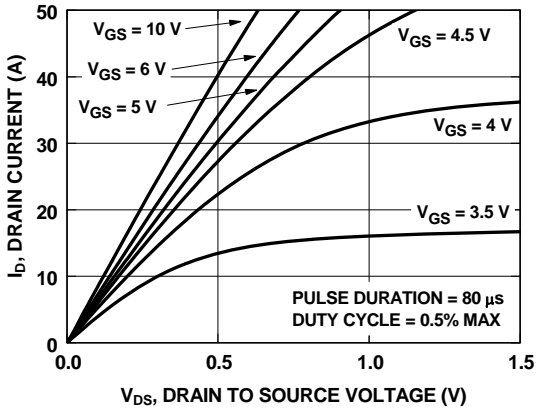


Figure 1. On-Region Characteristics

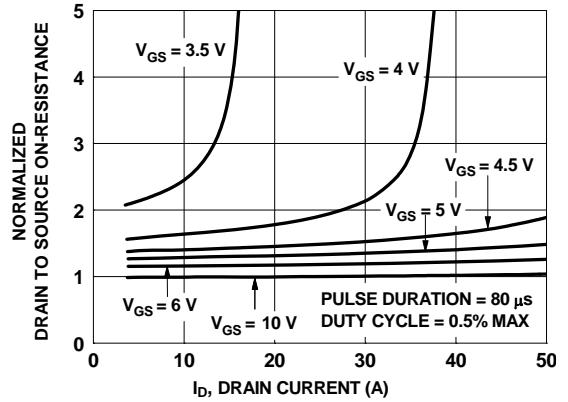


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

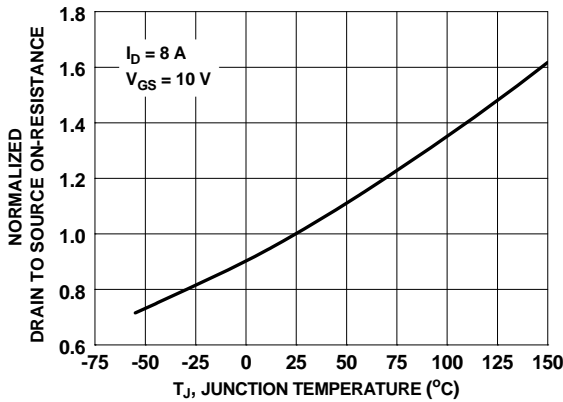


Figure 3. Normalized On-Resistance vs Junction Temperature

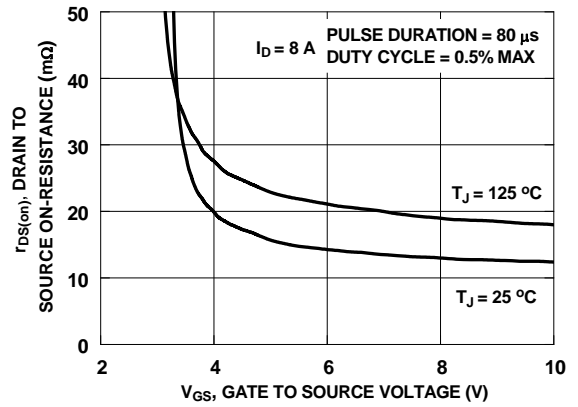


Figure 4. On-Resistance vs Gate to Source Voltage

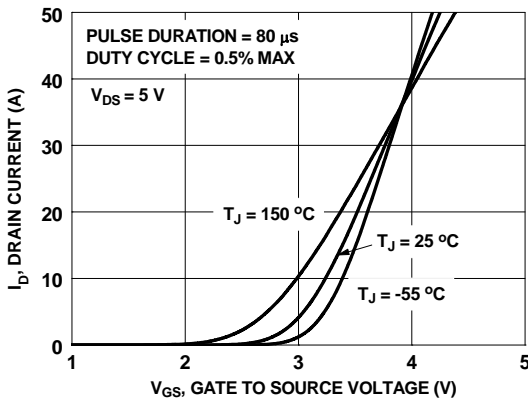


Figure 5. Transfer Characteristics

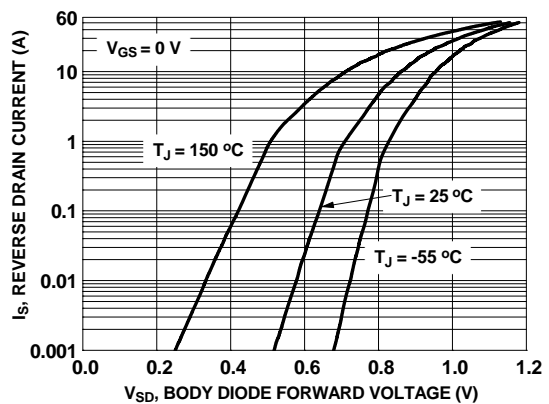


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

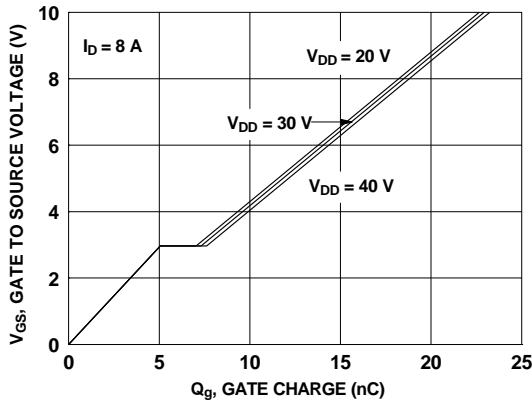


Figure 7. Gate Charge Characteristics

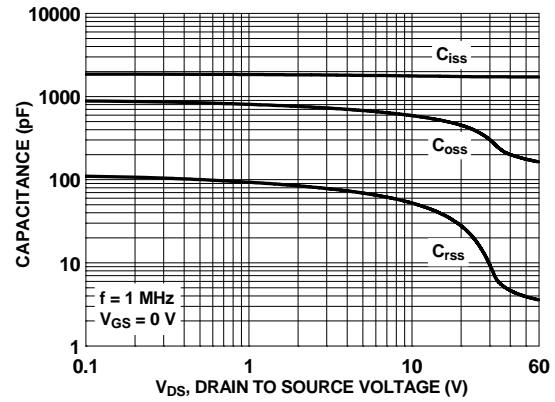


Figure 8. Capacitance vs Drain to Source Voltage

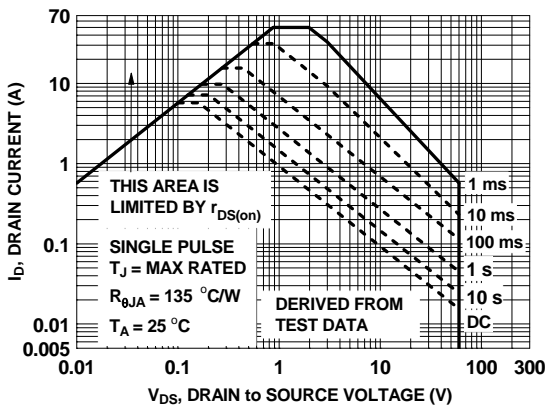


Figure 9. Forward Bias Safe Operating Area

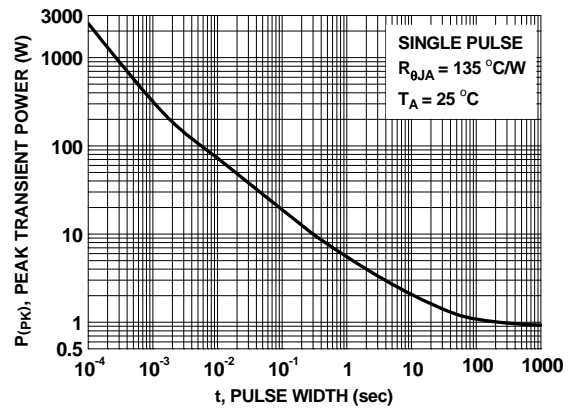


Figure 10. Single Pulse Maximum Power Dissipation

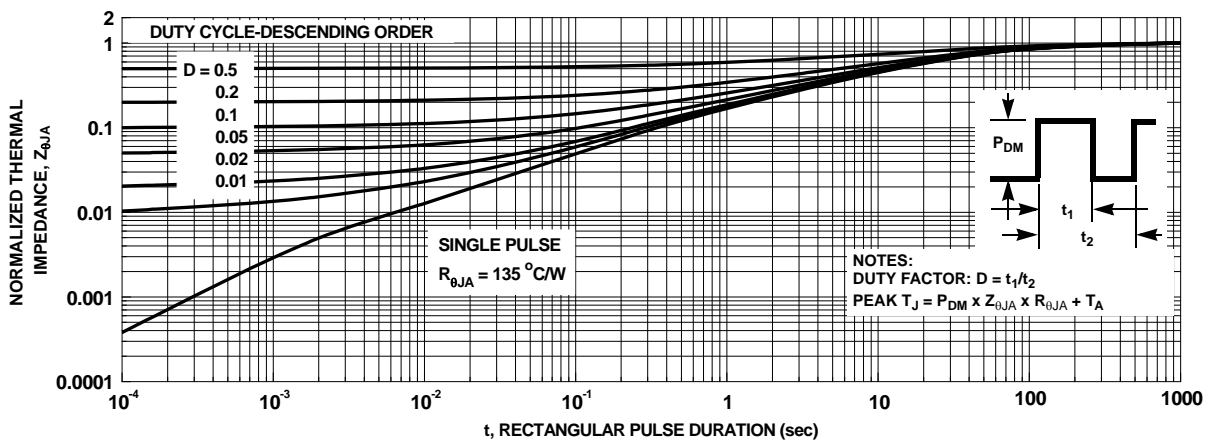
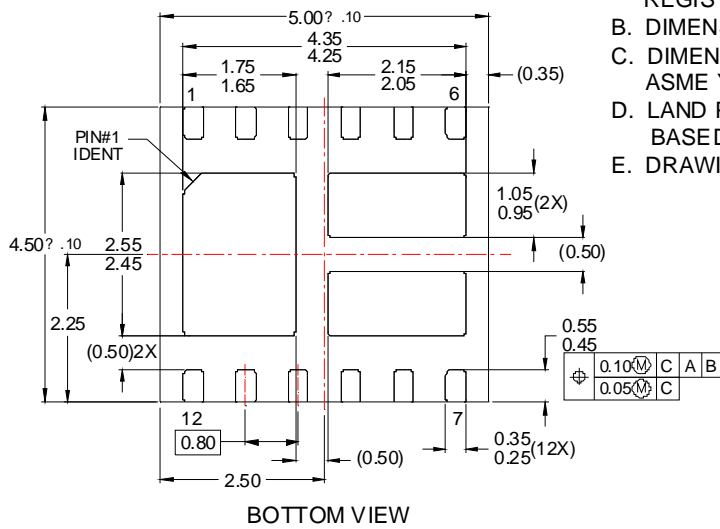
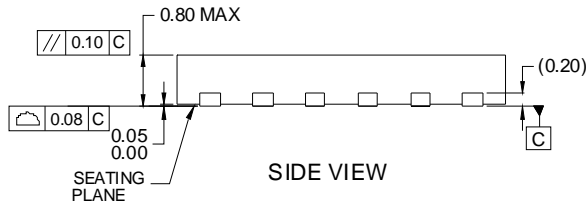
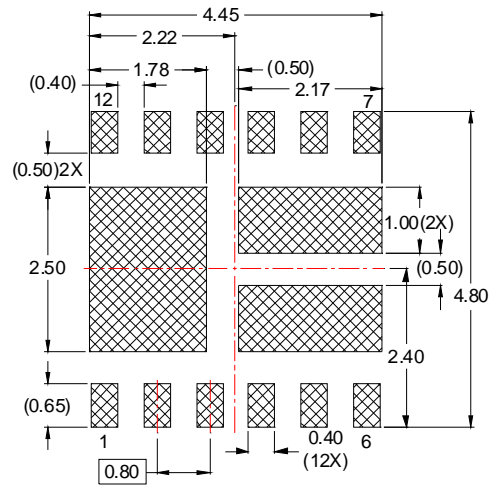
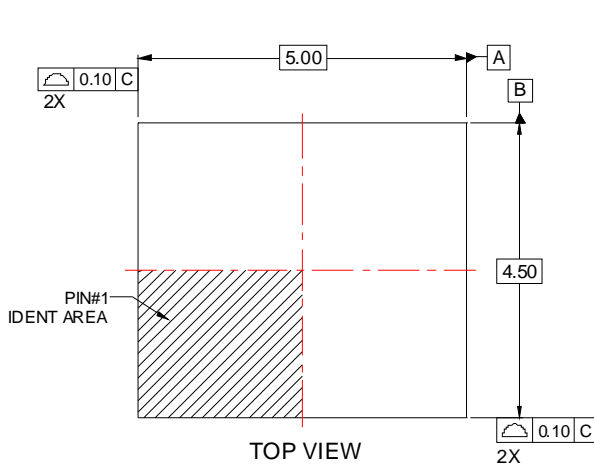


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout






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- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
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