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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

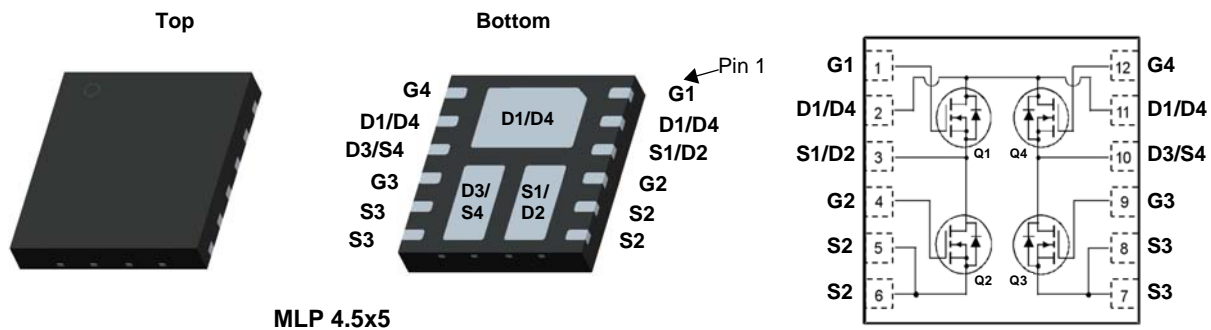


### General Description

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	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$			$\pm 100$	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 $\Omega$
		$V_{GS} = 6\text{ V}$ , $I_D = 7\text{ A}$		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

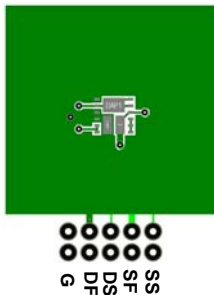
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}$ , $I_D = 8\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		8.8	18	ns
$t_r$	Rise Time			3.8	10	ns
$t_{d(off)}$	Turn-Off Delay Time			22	35	ns
$t_f$	Fall Time			2.8	10	ns
$Q_g$	Total Gate Charge	$V_{GS} = 0\text{ V to } 10\text{ V}$	$V_{DD} = 30\text{ V}$ , $I_D = 8\text{ A}$	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

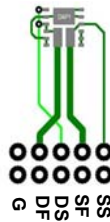
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 8\text{ A}$ (Note 2)		0.8	1.3	V
		$V_{GS} = 0\text{ V}$ , $I_S = 1.6\text{ A}$ (Note 2)		0.7	1.2	
$t_{rr}$	Reverse Recovery Time	$I_F = 8\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		27	43	ns
$Q_{rr}$	Reverse Recovery Charge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

#### Notes:

- $R_{\theta JA}$  is determined with the device mounted on a  $1\text{ in}^2$  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.



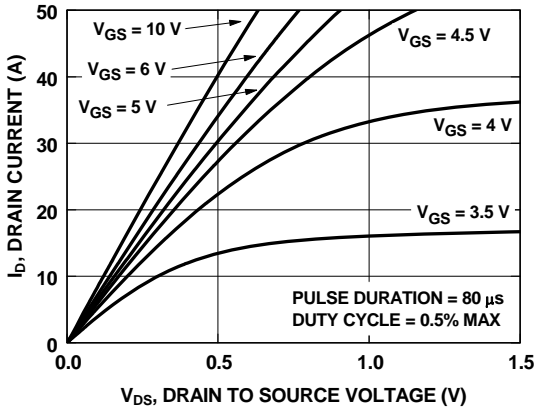
a.  $65\text{ }^\circ\text{C/W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper. the board designed Q1+Q3 or Q2+Q4.



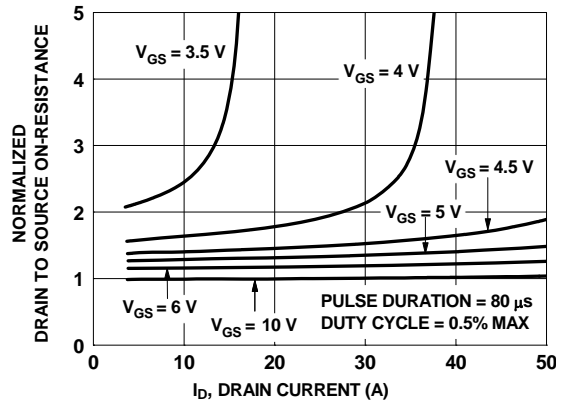
b.  $135\text{ }^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper. the board designed Q1+Q3 or Q2+Q4.

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

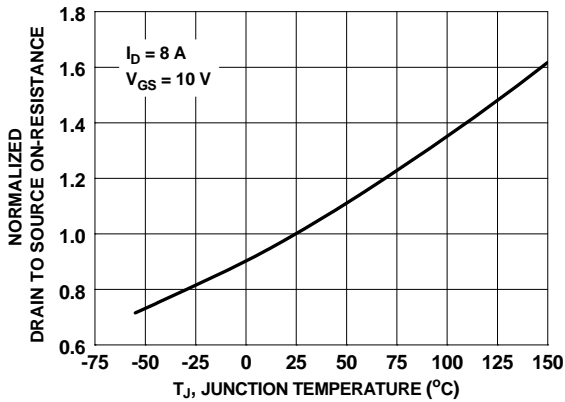
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



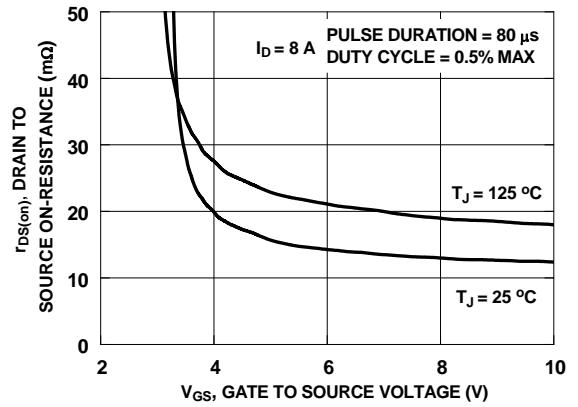
**Figure 1. On-Region Characteristics**



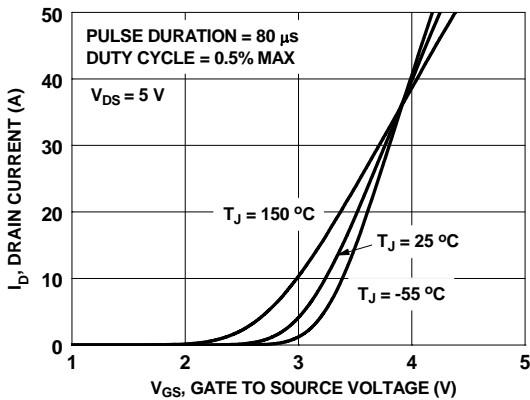
**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**



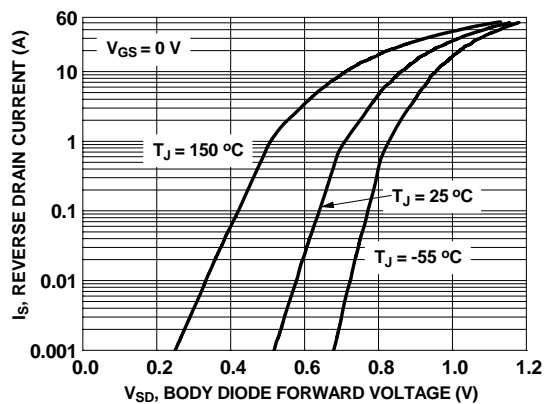
**Figure 3. Normalized On-Resistance vs Junction Temperature**



**Figure 4. On-Resistance vs Gate to Source Voltage**

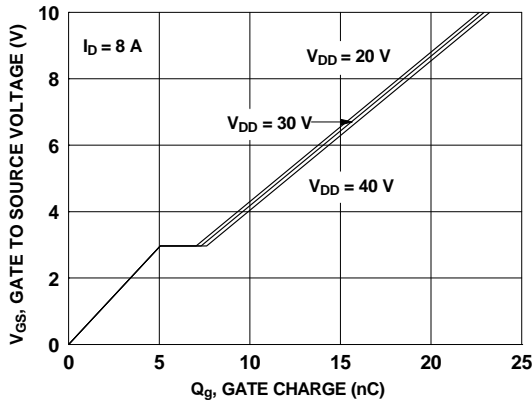


**Figure 5. Transfer Characteristics**

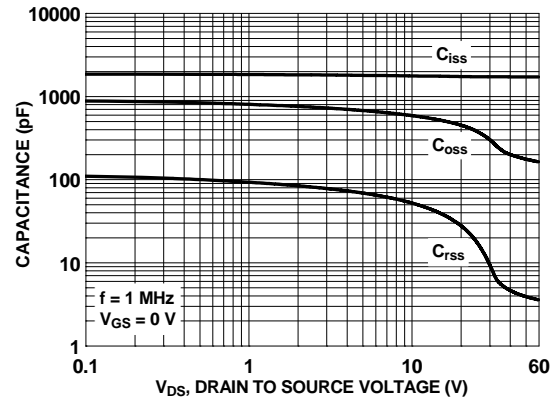


**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

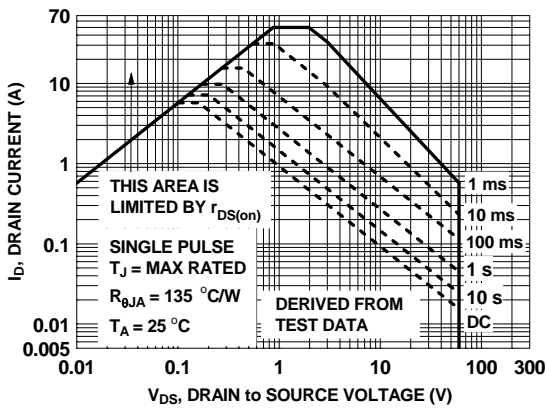
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



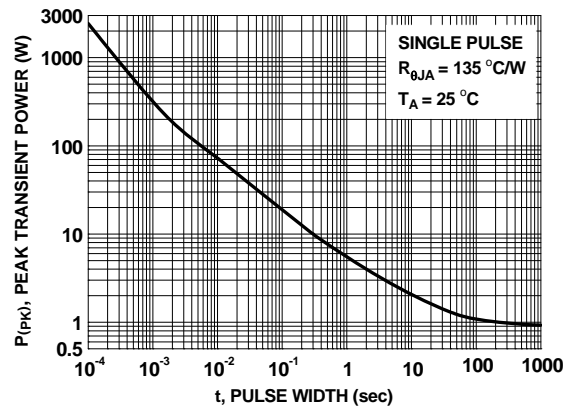
**Figure 7. Gate Charge Characteristics**



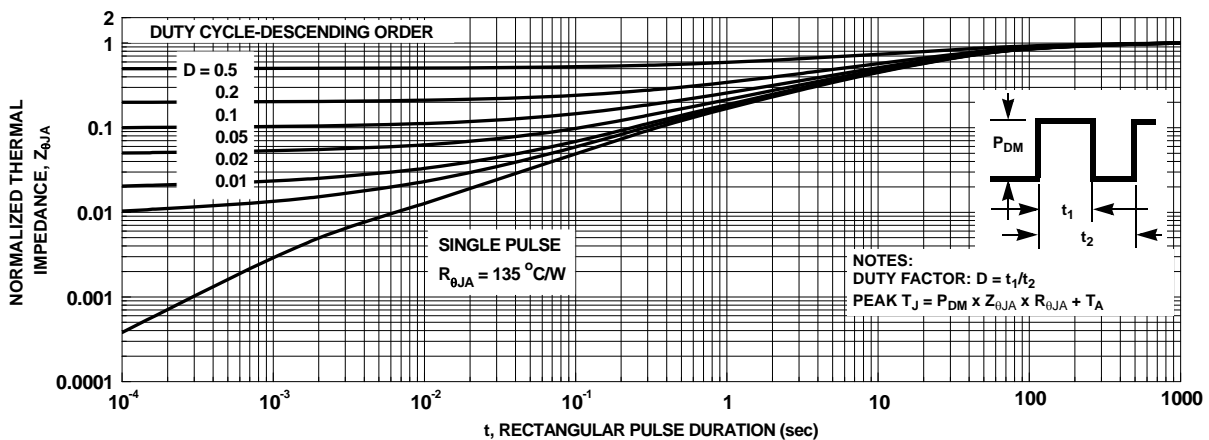
**Figure 8. Capacitance vs Drain to Source Voltage**



**Figure 9. Forward Bias Safe Operating Area**



**Figure 10. Single Pulse Maximum Power Dissipation**



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





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