

STLJFS014N04M8L

MOSFET, Single N-Channel, POWERTRENCH[®]

40 V, 10 A, 14 mΩ

General Description

This device has been designed to provide maximum efficiency and thermal performance for synchronous buck converters. The low $r_{DS(on)}$ and gate charge provide excellent switching performance.

Features

- Max $r_{DS(on)}$ = 14 mΩ at $V_{GS} = 10$ V, $I_D = 10$ A
- Max $r_{DS(on)}$ = 18 mΩ at $V_{GS} = 4.5$ V, $I_D = 8.5$ A
- Low Profile – 0.8 mm maximum in the new package MicroFET 2 x 2 mm
- Free from halogenated compounds and antimony oxides
- RoHS Compliant

Application

- DC–DC Buck Converters

MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{DS}	Drain to Source Voltage	40	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current – Continuous $T_A = 25^\circ\text{C}$ (Note 2a)	10	A
	– Pulsed (Note 4)	80	
P_D	Power dissipation $T_A = 25^\circ\text{C}$ (Note 2a)	2.4	W
	Power dissipation $T_A = 25^\circ\text{C}$ (Note 2b)	0.9	
T_J , T_{STG}	Operating and Storage Junction Temperature Range	-55 to $+150$	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 2a)	52	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 2b)	145	

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Shipping [†]
051	STLJFS014N04M8L	MicroFET 2x2	3000 Units/ Tape & Reel

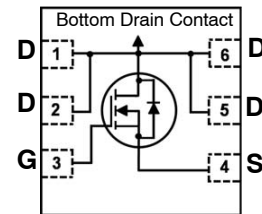
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



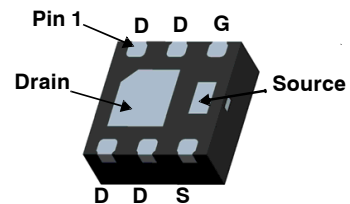
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ELECTRICAL CONNECTION



Single N-Channel MOSFET



MicroFET 2x2
(WDFN6 2x2, 0.65P)
CASE 511DB

MARKING DIAGRAM

&Z&2&K
051

&Z = Assembly Plant Code
&2 = Numeric Date Code
&K = Lot Code
051 = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 16 of this data sheet.

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ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, referenced to 25°C		22		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\ \text{V}$, $V_{GS} = 0\ \text{V}$			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	$V_{GS} = V_{DS}$, $I_D = 250\ \mu\text{A}$	1.0	1.6	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, referenced to 25°C		-5		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\ \text{V}$, $I_D = 10\ \text{A}$		11	14	m Ω
		$V_{GS} = 4.5\ \text{V}$, $I_D = 8.5\ \text{A}$		14	18	
		$V_{GS} = 10\ \text{V}$, $I_D = 10\ \text{A}$, $T_J = 125^\circ\text{C}$		15	19	
g_{FS}	Forward Transconductance	$V_{DD} = 5\ \text{V}$, $I_D = 10\ \text{A}$		35		S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 20\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$		901	1260	pF
C_{oss}	Output Capacitance			251	350	
C_{rss}	Reverse Transfer Capacitance			16	25	
R_g	Gate Resistance		0.1	0.6	1.8	Ω

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn – On Delay Time	$V_{DD} = 20\ \text{V}$, $I_D = 10\ \text{A}$, $V_{GS} = 10\ \text{V}$, $R_{GEN} = 6\ \Omega$		6.4	13	ns
t_r	Rise Time			1.8	10	
$t_{D(off)}$	Turn – Off Delay Time			17	31	
t_f	Fall Time			1.8	10	
Q_g	Total Gate Charge	$V_{GS} = 0\ \text{V}$ to $10\ \text{V}$ $V_{GS} = 0\ \text{V}$ to $4.5\ \text{V}$ $V_{DD} = 20\ \text{V}$, $i_D = 10\ \text{A}$		14	20	nC
Q_g	Total Gate Charge			6.4	9.0	
Q_{gs}	Total Gate Charge			2.4	3.7	
Q_{gd}	Gate to Source Charge			1.8	2.5	

DRAIN-SOURCE DIODE CHARACTERISTICS

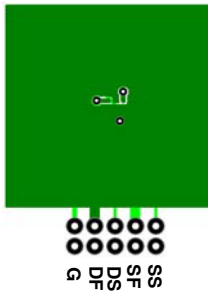
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\ \text{V}$, $I_S = 2\ \text{A}$ (Note 3)		0.7	1.2	V
		$V_{GS} = 0\ \text{V}$, $I_S = 10\ \text{A}$ (Note 3)		0.8	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 10\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$		23	37	ns
Q_{rr}	Reverse Recovery Charge			6.7	14	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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NOTES:

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



a) 52°C/W when mounted on a 1 in² pad of 2 oz copper.



b) 145°C/W when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
- Pulsed I_D limited by junction temperature, $t_d \leq 100 \mu s$, please refer to SOA curve for more details.

TYPICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ unless otherwise noted

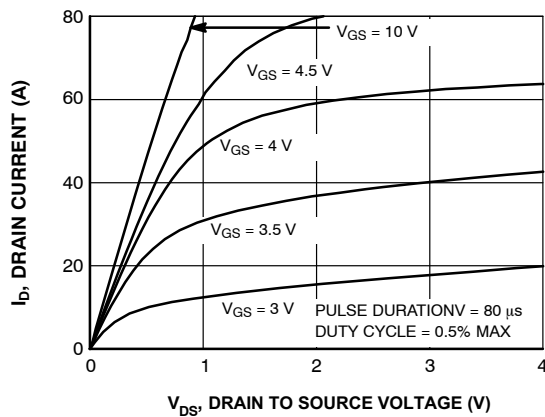


Figure 14. On Region Characteristics

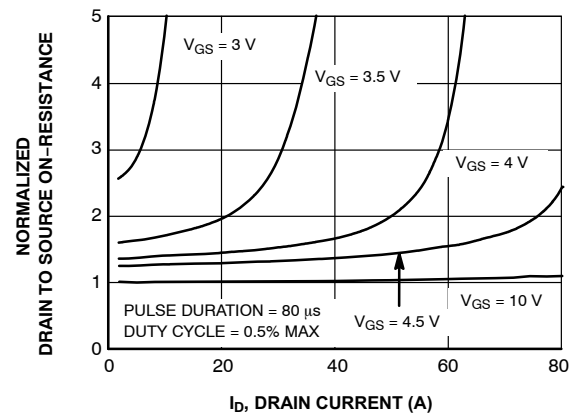


Figure 15. Normalized On-Resistance vs. Drain Current and Gate Voltage

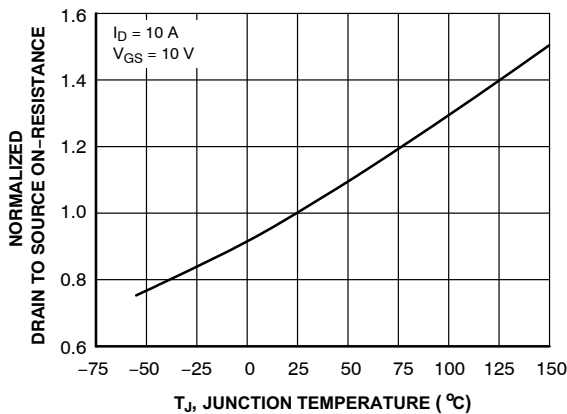


Figure 16. Normalized On Resistance vs. Junction Temperature

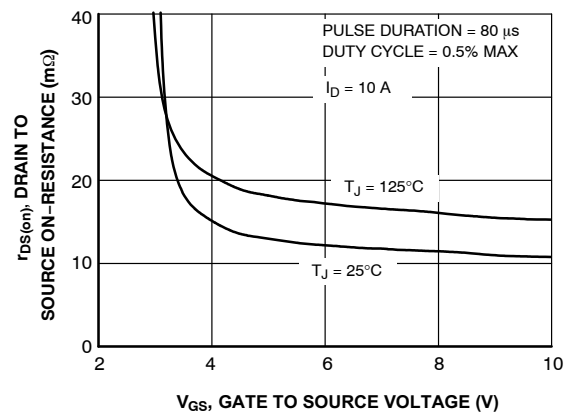


Figure 17. On-Resistance vs. Gate to Source Voltage

TYPICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ unless otherwise noted (continued)

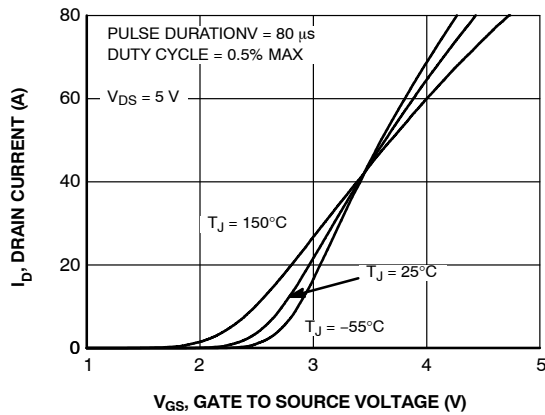


Figure 18. Transfer Characteristics

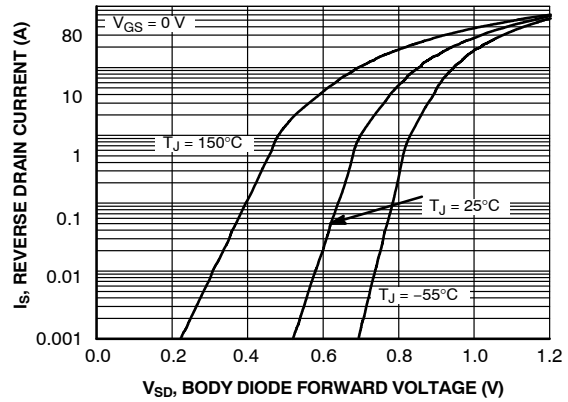


Figure 19. Source to Drain Diode Forward Voltage vs. Source Current

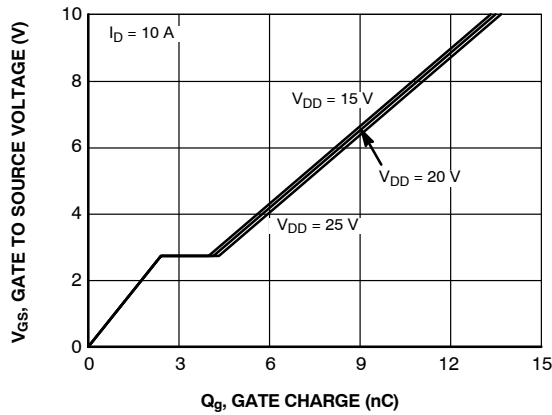


Figure 20. Gate Charge Characteristics

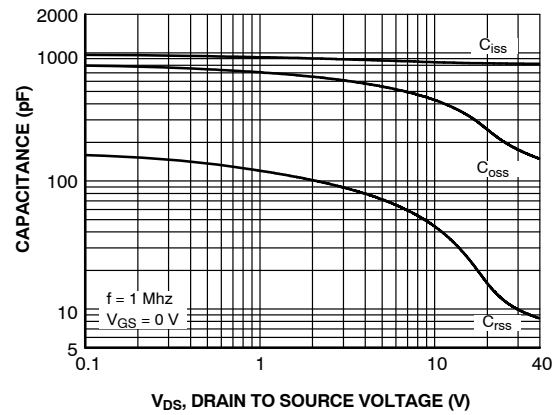


Figure 21. Capacitance vs. Drain to Source Voltage

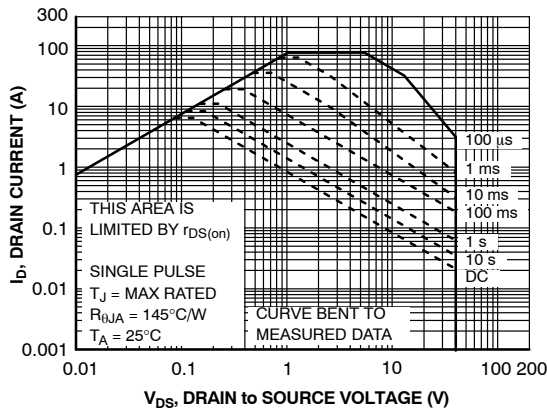


Figure 22. Forward Bias Safe Operating Area

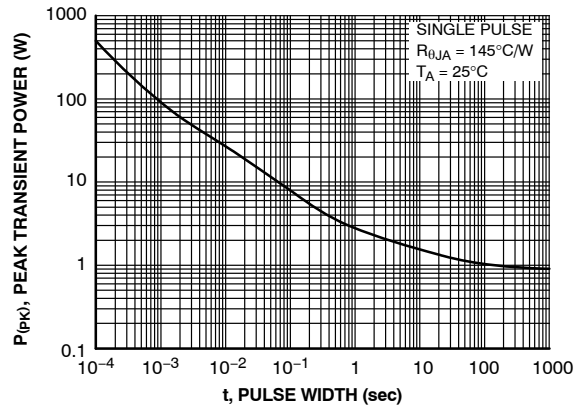


Figure 23. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS $T_J = 25^\circ\text{C}$ unless otherwise noted (continued)

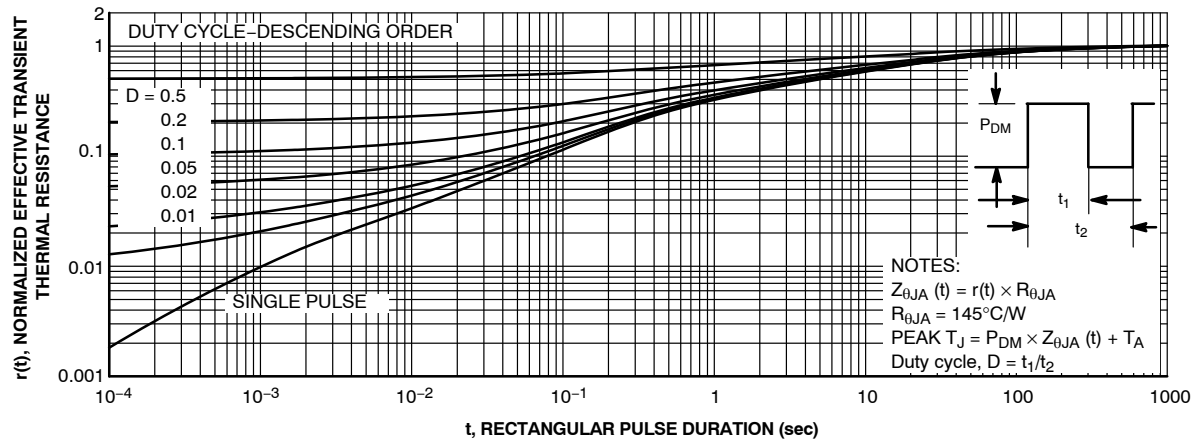
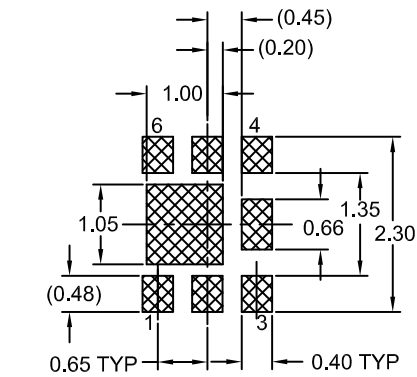
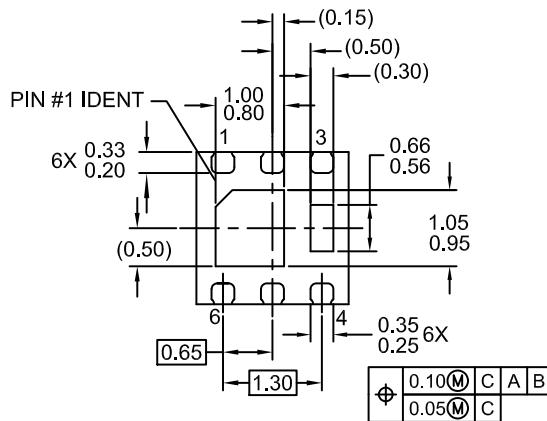
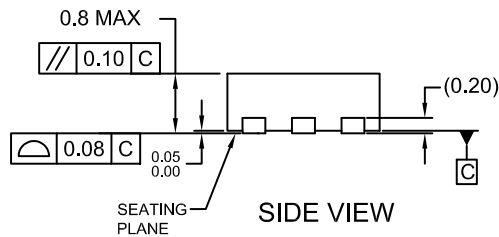
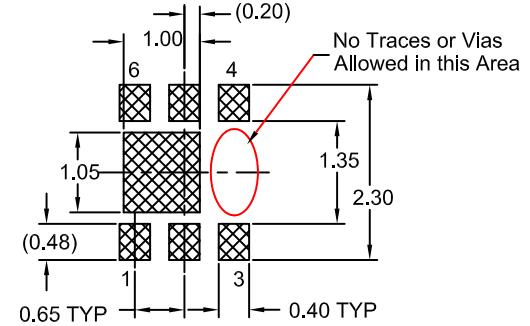
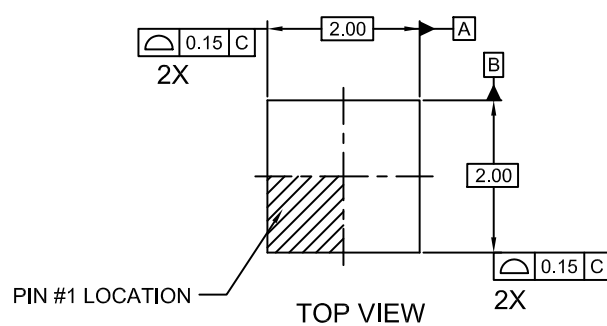


Figure 24. Single Pulse Junction-to-Ambient Transient Thermal Response Curve

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WDFN6 2x2, 0.65P
CASE 511DB
ISSUE O


DATE 31 AUG 2016



NOTES:

- A. DOES NOT FULLY CONFORM TO JEDEC REGISTRATION MO-229 DATED AUG/2003
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

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