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N-Channel PowerTrench[®] SyncFETTM 30 V, 21 A, 4.4 m Ω

Features

- Max $r_{DS(on)}$ = 4.4 m Ω at V_{GS} = 10 V, I_D = 19 A
- Max $r_{DS(on)} = 5.2 \text{ m}\Omega \text{ at } V_{GS} = 4.5 \text{ V}, I_D = 17.5 \text{ A}$
- Advanced package and silicon combination for low r_{DS(on)} and high efficiency
- SyncFET Schottky Body Diode
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

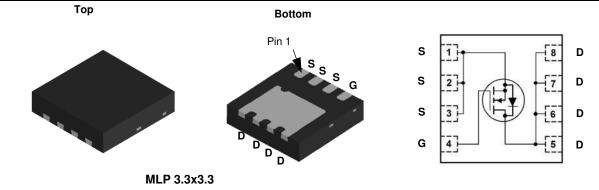


General Description

The FDMC8026S has been designed to minimize losses in power conversion application. Advancements in both silicon and package technologies have been combined to offer the lowest $r_{DS(on)}$ while maintaining excellent switching performance.This device has the added benefit of an efficient monolithic schottky body diode.

Applications

- Synchronous Rectifier for DC/DC Converters
- Notebook Vcore/GPU low side switch
- Networking Point of Load low side switch
- Telecom secondary side rectification



MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Param		Ratings	Units		
V _{DS}	Drain to Source Voltage			30	V	
V _{GS}	Gate to Source Voltage		(Note 4)	±20	V	
I _D	Drain Current -Continuous	$T_{\rm C} = 25^{\circ}{\rm C}$		21		
	-Continuous	T _A = 25°C	(Note 1a)	19	Α	
	-Pulsed			100		
E _{AS}	Single Pulse Avalance Energy		(Note 3)	66	mJ	
P _D	Power Dissipation	$T_{\rm C} = 25^{\circ}{\rm C}$		36		
	Power Dissipation	T _A = 25°C	(Note 1a)	2.4		
T _J , T _{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C	

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.4	°C/W
R_{\thetaJA}	Thermal Resistance, Junction to Ambient (Note 1	a) 53	C/ VV

Package Marking and Ordering Information

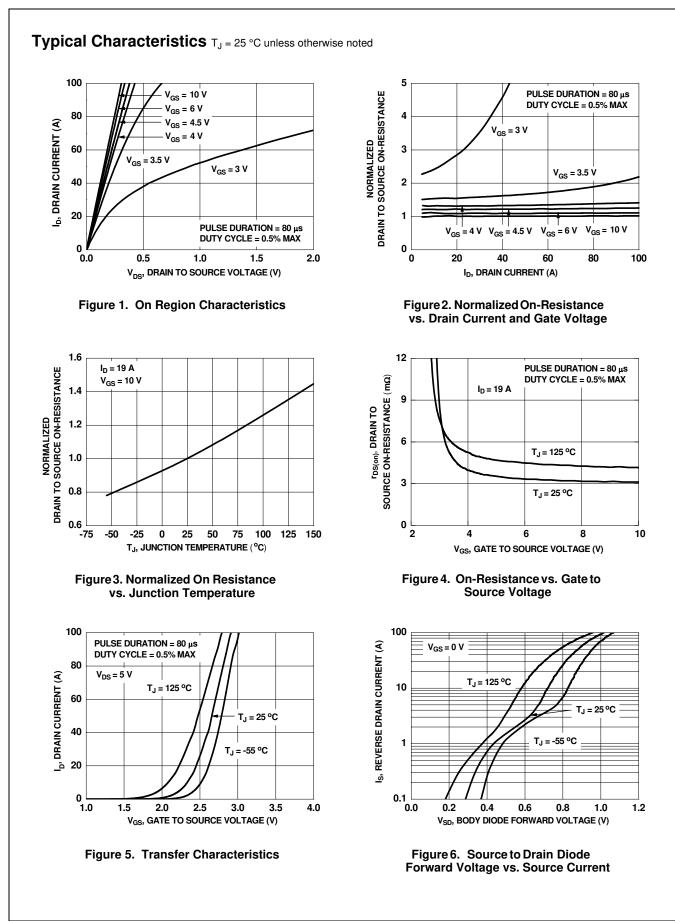
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC8026S	FDMC8026S	MLP 3.3X3.3	13 "	12 mm	3000 units

teristics Drain to Source Breakdown Voltage Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current	$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}$ $I_D = 10 \text{ mA}, \text{ referenced to } 25 \text{ °C}$	30	Тур		V
Drain to Source Breakdown Voltage Breakdown Voltage Temperature Coefficient		30	26		V
Breakdown Voltage Temperature			26		-
Zero Gate Voltage Drain Current					mV/°C
	$V_{DS} = 24 V, V_{GS} = 0 V$			500	μA
Gate to Source Leakage Current, Forward	$V_{GS} = 20 V, V_{DS} = 0 V$			100	nA
toristics					
	$V_{OO} = V_{OO}$ $I_{D} = 1$ mA	12	16	3.0	V
Gate to Source Threshold Voltage	$I_D = 10$ mA, referenced to 25 °C		-5	0.0	mV/°C
	V _{GS} = 10 V, I _D = 19 A		3.8	4.4	
Static Drain to Source On Resistance $\frac{V_{GS} = 4.5 \text{ V, }I_D = 17.5 \text{ A}}{V_{GS} = 10 \text{ V, }I_D = 19 \text{ A,}}$ $T_J = 125 \text{ °C}$			4.5	5.2	mΩ
			4.5	5.8	1115.2
Forward Transconductance	$V_{DS} = 5 V, I_{D} = 19 A$		106		S
Characteristics					
Input Capacitance			2380	3165	pF
Output Capacitance			885	1175	pF
Reverse Transfer Capacitance			100	150	pF
Gate Resistance		0.1	0.7	2.5	Ω
Characteristics	1			00	
					ns
			-		ns
•	$V_{\rm GS} = 10^{-10}$, $N_{\rm GEN} = 0.22$			-	ns
			-		ns nC
Č Č			-	-	nC
				23	nC
	-				nC
_			Ŭ		
	$V_{GS} = 0 V, I_S = 2 A$ (Note 2)		0.6	0.8	v
	$V_{GS} = 0 V, I_{S} = 19 A$ (Note 2)		0.8	1.2	v
Reverse Recovery Time	- I _F = 19 A di/dt = 300 A/us		29	47	ns
Reverse Recovery Charge	$F = 10$ M, $a_0 a_1 = 000$ M μo		33	53	nC
	Temperature Coefficient Static Drain to Source On Resistance Forward Transconductance haracteristics Input Capacitance Output Capacitance Gate Resistance Characteristics Turn-On Delay Time Rise Time Turn-Off Delay Time Fall Time Total Gate Charge Gate to Source Charge Gate to Drain "Miller" Charge Ce Diode Characteristics Source to Drain Diode Forward Voltage Reverse Recovery Time	Gate to Source Threshold Voltage Gate to Source Threshold Voltage Temperature Coefficient $V_{GS} = V_{DS}$, $I_D = 1 \text{ mA}$ I_D = 10 mA, referenced to 25 °CStatic Drain to Source On Resistance $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$ $V_{GS} = 4.5 \text{ V}$, $I_D = 17.5 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$, $T_J = 125 °C$ Forward Transconductance $V_{DS} = 5 \text{ V}$, $I_D = 19 \text{ A}$ $T_J = 125 °C$ Input Capacitance Output Capacitance $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ Gate Resistance $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ CharacteristicsTurn-On Delay Time Rise Time $V_{DD} = 15 \text{ V}$, $I_D = 19 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$ Turn-Off Delay Time Fall Time $V_{GS} = 0 \text{ V to 10 V}$ $V_{CS} = 0 \text{ V to 4.5 V}$ $I_D = 19 \text{ A}$ Gate to Drain "Miller" Charge $V_{GS} = 0 \text{ V}$, $I_S = 2 \text{ A}$ $V_{GS} = 10 \text{ A}$, $I_D = 19 \text{ A}$ Source to Drain Diode Forward Voltage Reverse Recovery Time $V_{GS} = 0 \text{ V}$, $I_S = 2 \text{ A}$ $V_{GS} = 10 \text{ A}$	Gate to Source Threshold Voltage Gate to Source Threshold Voltage Temperature Coefficient $V_{GS} = V_{DS}$, $I_D = 1 \text{ mA}$ 1.2Gate to Source Threshold Voltage Temperature Coefficient $I_D = 10 \text{ mA}$, referenced to 25 °C $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$ Static Drain to Source On Resistance $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$ $V_{GS} = 4.5 \text{ V}$, $I_D = 19 \text{ A}$, $T_J = 125 °C$ Forward Transconductance $V_{DS} = 5 \text{ V}$, $I_D = 19 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$ haracteristicsInput Capacitance Output Capacitance $V_{DS} = 5 \text{ V}$, $V_{GS} = 0 \text{ V}$, f = 1 MHz I_{Gate} Gate Resistance $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, f = 1 MHz I_{Gate} I_{Gate} Characteristics $V_{DD} = 15 \text{ V}$, $I_D = 19 \text{ A}$, $V_{GS} = 10 \text{ V}$, $R_{GEN} = 6 \Omega$ I_{Gate} Turn-On Delay Time Fall Time $V_{GS} = 0 \text{ V to 10 V}$ $V_{GS} = 0 \text{ V to 10 V}$ $V_{DD} = 15 \text{ V}$, $I_D = 19 \text{ A}$ $I_D = 19 \text{ A}$ Total Gate Charge $V_{GS} = 0 \text{ V to 4.5 V}$ $V_{DD} = 15 \text{ V}$, $I_D = 19 \text{ A}$ $I_D = 19 \text{ A}$ Gate to Drain "Miller" Charge $V_{GS} = 0 \text{ V to 4.5 V}$ $V_{GS} = 0 \text{ V to 4.5 V}$ $V_{DD} = 15 \text{ V}$, $I_D = 19 \text{ A}$ Gate to Drain Diode Forward Voltage $V_{GS} = 0 \text{ V}$, $I_S = 2 \text{ (Note 2)}$ $V_{GS} = 0 \text{ V}$, $I_S = 19 \text{ A}$ $V_{OD} = 12 \text{ A}$ Reverse Recovery Time $I_{V} = 19 \text{ A}$ $I_{V} = 19 \text{ A}$ $I_{V} = 19 \text{ A}$	Gate to Source Threshold Voltage Gate to Source Threshold Voltage Temperature Coefficient $V_{GS} = V_{DS}$, $I_D = 1 \text{ mA}$ 1.21.6Indext Gate to Source Threshold Voltage Temperature Coefficient $I_D = 10 \text{ mA}$, referenced to 25 °C-5VGS = 10 V, $I_D = 19 \text{ A}$ 3.8Static Drain to Source On Resistance $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$ 3.8 $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$ 4.5Forward Transconductance $V_{DS} = 5 \text{ V}$, $I_D = 19 \text{ A}$ 106haracteristicsInput Capacitance Output Capacitance $V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ 2380Output Capacitance Gate Resistance $V_{DD} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$ 110Gate Resistance0.1 0.70.1 0.7Characteristics11111Rise Time Turn-On Delay Time $V_{GS} = 0 \text{ V}$ to 10 V $V_{GS} = 10 \text{ V}$, $I_D = 19 \text{ A}$, $V_{GS} = 10 \text{ V}$, $I_D = 15 \text{ V}$, $I_D = 15 \text{ V}$, $I_D = 19 \text{ A}$ 37Total Gate Charge Gate to Source Charge $V_{GS} = 0 \text{ V}$ to 10 V $I_D = 19 \text{ A}$ 37Gate to Source Charge Gate to Drain "Miller" Charge6Ce Diode CharacteristicsSource to Drain Diode Forward Voltage $V_{GS} = 0 \text{ V}$, $I_S = 2 \text{ (Note 2)}$ $V_{GS} = 0 \text{ V}$, $I_S = 19 \text{ A}$ $V_{GS} = 0 \text{ V}$, $I_S = 19 \text{ A}$ $V_{GS} = 0 \text{ A}$ $V_{GS} = 0 \text{ A}$ 0.6	

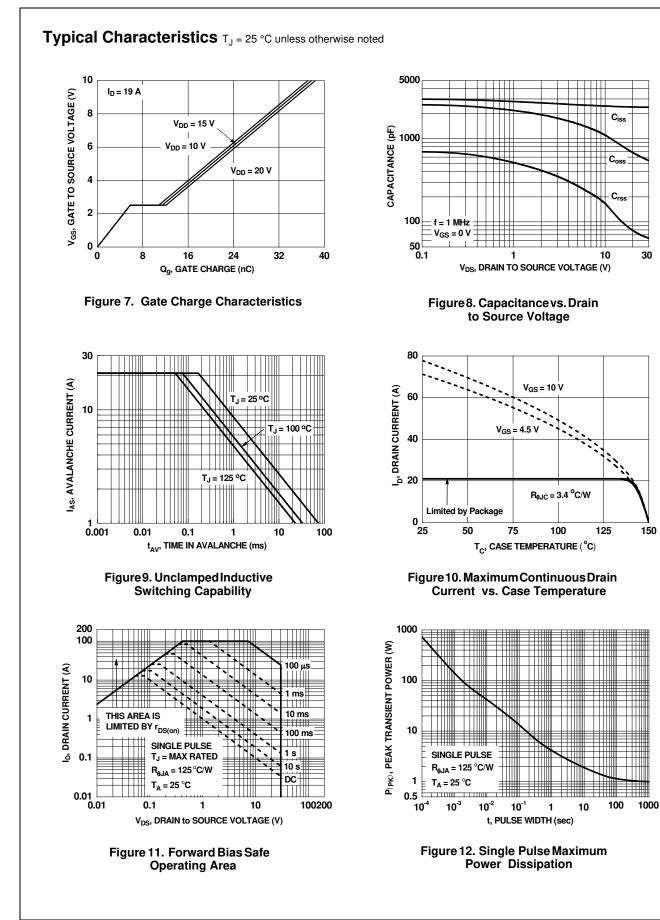
2. Pulse Test: Pulse Width < 300 $\mu s,$ Duty cycle < 2.0%.

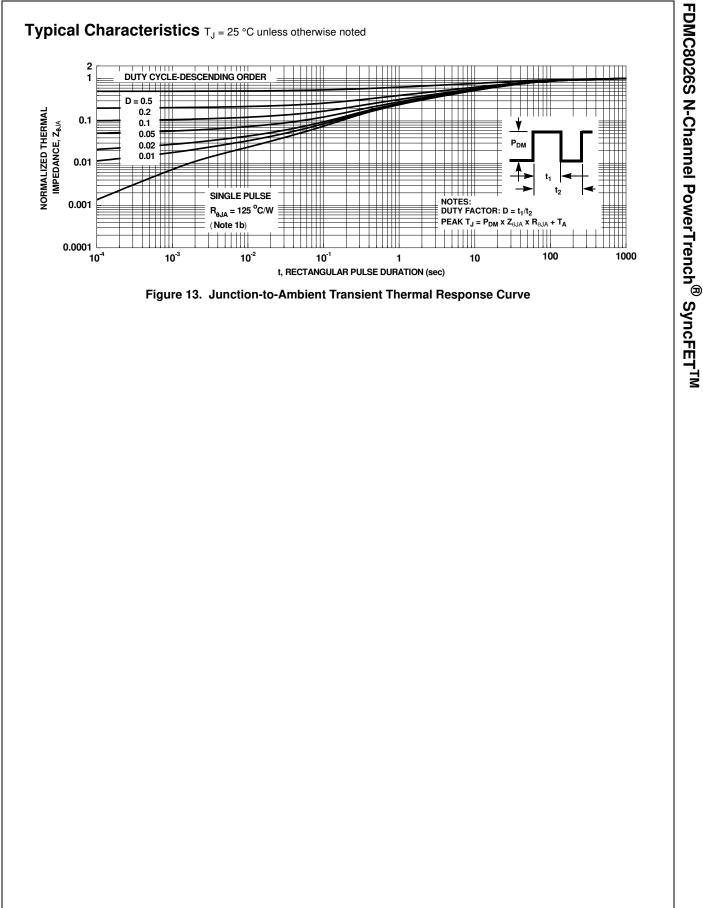
3. E_{AS} of 66 mJ is based on starting T_J = 25 °C, L = 0.3 mH, I_{AS} = 21 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% tested at L = 3 mH, I_{AS} = 10.2 A.

4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse occurrence only. No continuous rating is implied.









FDMC8026S N-Channel PowerTrench[®] SyncFETTM

Typical Characteristics (continued)

SyncFET[™] Schottky body diode Characteristics

Fairchild's SyncFETTM process embeds a Schottky diode in parallel with PowerTrench MOSFET. This diode exhibits similar characteristics to a discrete external Schottky diode in parallel with a MOSFET. Figure 14 shows the reverse recovery characteristic of the FDMC8026S.

Schottky barrier diodes exhibit significant leakage at high temperature and high reverse voltage. This will increase the power in the device.

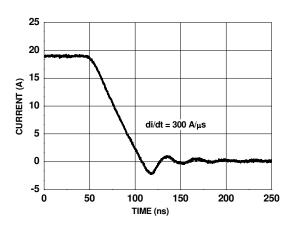
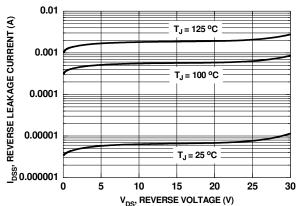
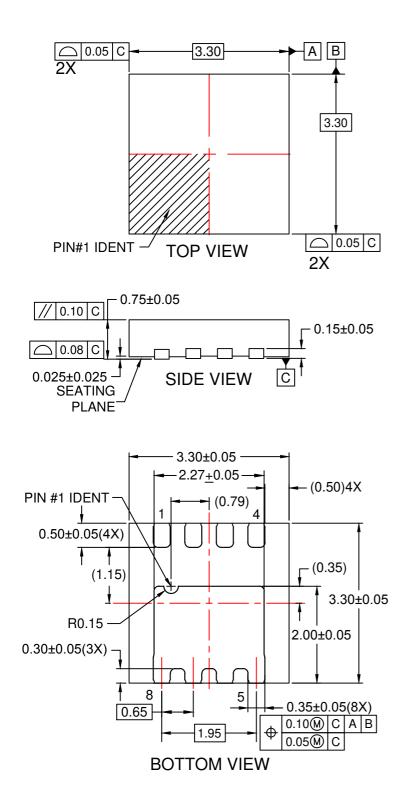
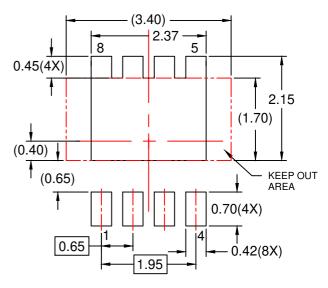


Figure 14. FDMC8026S SyncFET[™] Body Diode Reverse Recovery Characteristic









RECOMMENDED LAND PATTERN

NOTES:

- A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- E. DRAWING FILENAME: MKT-MLP08Srev3.



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