

MOSFET - N-Channel, POWERTRENCH®, DUAL COOL® 88

150 V, 72 A, 9.0 mΩ

FDMT800152DC

General Description

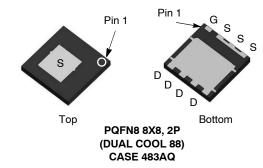
This N-Channel MOSFET is produced using **onsemi**'s advanced POWERTRENCH process. Advancements in both silicon and DUAL COOL package technologies have been combined to offer the lowest $R_{DS(on)}$ while maintaining excellent switching performance by extremely low Junction-to-Ambient thermal resistance.

Features

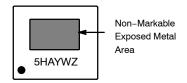
- Max $R_{DS(on)} = 9.0 \text{ m}\Omega$ at $V_{GS} = 10 \text{ V}$, $I_D = 13 \text{ A}$
- Max $R_{DS(on)} = 11.5 \text{ m}\Omega$ at $V_{GS} = 6 \text{ V}$, $I_D = 11 \text{ A}$
- Advanced Package and Silicon Combination for Low R_{DS(on)} and High Efficiency
- Next Generation Enhanced Body Diode Technology, Engineered for Soft Recovery
- Low Profile 8x8 mm MLP Package
- MSL1 Robust Package Design
- 100% UIL Tested
- RoHS Compliant

Applications

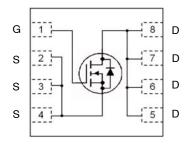
- OringFET / Load Switching
- Synchronous Rectification
- DC–DC Conversion



MARKING DIAGRAM



5H = Specific Device Code
A = Assembly Plant Code
YW = Date Code (Year & Week)
Z = Lot Code



ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

MOSFET MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter				Rating	Unit
V_{DS}	Drain to Source	Voltage			150	V
V _{GS}	Gate to Source \	/oltage			±20	V
I _D	Drain Current	Continuous	T _C = 25°C	(Note 5)	72	А
		Continuous	T _C = 100°C	(Note 5)	45	
		Continuous	T _A = 25°C	(Note 1a)	13	
		- Pulsed		(Note 4)	413	
E _{AS}	Single Pulse Ava	alanche Energy		(Note 3)	726	mJ
P_{D}	Power Dissipation	n	T _C = 25°C		113	W
	Power Dissipation	n	T _A = 25°C	(Note 1a)	3.2	
T _J , T _{STG}	Operating and St	torage Junction Temper	ature Range		-55 to +150	°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.

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

Parameter	Test Conditions	Min.	Тур.	Max.	Unit
RACTERISTICS					
Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	150	_	-	V
Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25°C	-	114	-	mV/°C
Zero Gate Voltage Drain Current	V _{DS} = 120 V, V _{GS} = 0 V	-	_	1	μΑ
Gate to Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	_	100	nA
ACTERISTICS					
Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	2.0	2.9	4.0	V
Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25°C	-	-11	-	mV/°C
Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 13 A	-	6.9	9.0	mΩ
	V _{GS} = 6 V, I _D = 11 A	-	8.6	11.5	1
	V _{GS} = 10 V, I _D = 13 A, T _J = 125°C	-	14.6	19	1
Forward Transconductance	V _{DS} = 5 V, I _D = 13 A	-	41	_	S
CHARACTERISTICS					
Input Capacitance	V _{DS} = 75 V, V _{GS} = 0 V, f = 1 MHz	-	4196	5875	pF
Output Capacitance	1	-	379	530	pF
Reverse Transfer Capacitance	1	-	16	30	pF
Gate Resistance		0.1	1.3	3.3	Ω
IG CHARACTERISTICS					
Turn-On Delay Time	V _{DD} = 75 V, I _D = 13 A,	-	24	39	ns
Rise Time	$V_{GS} = 10 \text{ V}, H_{GEN} = 6 \Omega$	-	13	23	ns
Turn-Off Delay Time]	-	36	58	ns
Fall Time]	-	7.9	16	ns
Total Gate Charge	$V_{GS} = 0 \text{ V to } 10 \text{ V}, V_{DD} = 75 \text{ V}, I_D = 13 \text{ A}$	-	59	83	nC
	$V_{GS} = 0 \text{ V to } 6 \text{ V}, V_{DD} = 75 \text{ V}, I_D = 13 \text{ A}$	-	38	53	
Gate to Source Charge	V _{DD} = 75 V, I _D = 13 A	-	18	-	nC
Gate to Drain "Miller" Charge	1	-	12	-	nC
DURCE DIODE CHARACTERISTICS					
Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _S = 2.9 A (Note 2)	-	0.7	1.1	V
	V _{GS} = 0 V, I _S = 13 A (Note 2)	_	0.8	1.2	
Reverse Recovery Time	I _F = 13 A, di/dt = 100 A/μs	-	95	152	ns
Reverse Recovery Charge		_	187	299	nC
	Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current Gate to Source Leakage Current ACTERISTICS Gate to Source Threshold Voltage Gate to Source Threshold Voltage Temperature Coefficient Static Drain to Source On Resistance Forward Transconductance CHARACTERISTICS Input Capacitance Output Capacitance Gate Resistance GCHARACTERISTICS Turn-On Delay Time Rise Time Turn-Off Delay Time Fall Time Total Gate Charge Gate to Source Charge Gate to Source Charge Gate to Drain "Miller" Charge DURCE DIODE CHARACTERISTICS Source to Drain Diode Forward Voltage Reverse Recovery Time	RACTERISTICS Drain to Source Breakdown Voltage $I_D = 250 \mu A$, $V_{GS} = 0 V$ Breakdown Voltage Temperature Coefficient $I_D = 250 \mu A$, referenced to $25^{\circ}C$ Zero Gate Voltage Drain Current $V_{DS} = 120 \text{ V}$, $V_{QS} = 0 \text{ V}$ Gate to Source Leakage Current $V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$ ACTERISTICS Gate to Source Threshold Voltage $I_D = 250 \mu A$, referenced to $25^{\circ}C$ Gate to Source Threshold Voltage Temperature Coefficient $I_D = 250 \mu A$, referenced to $25^{\circ}C$ Static Drain to Source On Resistance $V_{GS} = 10 \text{ V}$, $I_D = 13 \text{ A}$ VGS = 10 V, $I_D = 13 \text{ A}$ $V_{GS} = 10 \text{ V}$, $I_D = 13 \text{ A}$ VGS = 10 V, $I_D = 13 \text{ A}$ $V_{DS} = 5 \text{ V}$, $V_{DS} = 0 \text{ V}$, $V_{DS} = 10 \text{ MHz}$ Input Capacitance $V_{DS} = 75 \text{ V}$, $V_{GS} = 0 \text{ V}$, $V_{CS} = 0 $	AACTERISTICS Drain to Source Breakdown Voltage $I_D = 250 \mu A$, $V_{GS} = 0 V$ 150 Breakdown Voltage Temperature Coefficient $I_D = 250 \mu A$, referenced to 25°C - Zero Gate Voltage Drain Current $V_{DS} = 120 \text{ V}$, $V_{QS} = 0 \text{ V}$ - Gate to Source Leakage Current $V_{QS} = \pm 20 \text{ V}$, $V_{DS} = 0 \text{ V}$ - ACTERISTICS $I_D = 250 \mu A$ 2.0 Gate to Source Threshold Voltage Temperature Coefficient $I_D = 250 \mu A$, referenced to 25°C - Static Drain to Source On Resistance $V_{QS} = 10 \text{ V}$, $I_D = 13 \text{ A}$ - Vas = 6 V, $I_D = 13 A$ - - Vas = 10 V, $I_D = 13 A$, $I_D = 125°C$ - Forward Transconductance $V_{DS} = 5 \text{ V}$, $I_D = 13 \text{ A}$ - CHARACTERISTICS Input Capacitance VDS = 75 V, VQS = 0 V, f = 1 MHz - Output Capacitance VDS = 75 V, VQS = 0 V, f = 1 MHz - GCHARACTERISTICS Turn-On Delay Time VDS = 75 V, ID = 13 A, VQS = 10 V, RQEN = 6 Ω - Turn-Off Delay Time VQS = 0 V to 10 V, VDD = 75 V, ID = 13 A, VQS = 10 V, RQEN = 6 Ω - Turn-Off Delay Time VQS = 0 V to 10 V, VDD = 75 V, ID = 13 A, VQS = 0 V, ID = 13 A, VQS = 0 V, I	Drain to Source Breakdown Voltage I _D = 250 μA, V _{GS} = 0 V 150 -	ACTERISTICS Drain to Source Breakdown Voltage $I_{D} = 250 \mu A, V_{GS} = 0 V$ 150

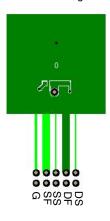
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

THERMAL CHARACTERISTICS

Symbol	Parameter		Ratings	Unit
$R_{ heta JC}$	Thermal Resistance, Junction to Case	(Top Source)	2.0	°C/W
$R_{ heta JC}$	Thermal Resistance, Junction to Case	(Bottom Drain)	1.1	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	38	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	81	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1c)	26	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1d)	34	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1e)	14	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1f)	16	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1g)	26	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1h)	60	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1i)	15	
$R_{ heta JA}$	Thermal Resistance, Junction to Ambient	(Note 1j)	21	
$R_{ heta JA}$	Thermal Resistance, Junction to Ambient	(Note 1k)	9	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1I)	11	

NOTES:

 R_{0,JA} is determined with the device mounted on a FR-4 board using a specified pad of 2 oz copper as shown below. R_{0CA} is determined by the user's board design.



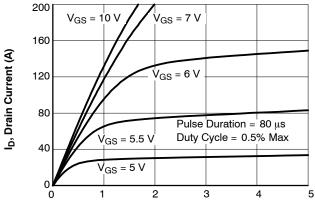
 a) 38°C/W when mounted on a 1 in² pad of 2 oz copper.



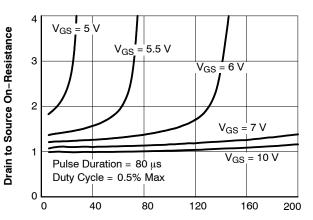
b) 81°C/W when mounted on a minimum pad of 2 oz copper.

- c) Still air, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, 1 in² pad of 2 oz copper
- d) Still air, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, minimum pad of 2 oz copper
- e) Still air, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in² pad of 2 oz copper
- f) Still air, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, minimum pad of 2 oz copper
- g) 200FPM Airflow, No Heat Sink, 1 in² pad of 2 oz copper
- h) 200FPM Airflow, No Heat Sink, minimum pad of 2 oz copper
- i) 200FPM Airflow, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, 1 in² pad of 2 oz copper
- j) 200FPM Airflow, 20.9 x 10.4 x 12.7 mm Aluminum Heat Sink, minimum pad of 2 oz copper
- k) 200FPM Airflow, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, 1 in² pad of 2 oz copper
- l) 200FPM Airflow, 45.2 x 41.4 x 11.7 mm Aavid Thermalloy Part # 10-L41B-11 Heat Sink, minimum pad of 2 oz copper
- 2. Pulse Test: Pulse Width < 300 μ s, Duty cycle < 2.0%.
- 3. E_{AS} of 726 mJ is based on starting T_J = 25°C; N-ch: L = 3 mH, I_{AS} = 22 A, V_{DD} = 150 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 69 A.
- 4. Pulsed Id please refer to Figure 11 SOA graph for more details.
- 5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)



Normalized

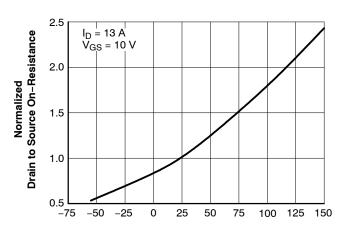


V_{DS}, Drain to Source Voltage (V)

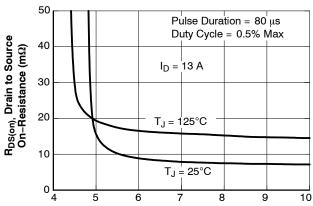
Figure 1. On-Region Characteristics

I_D, Drain Current (A)

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

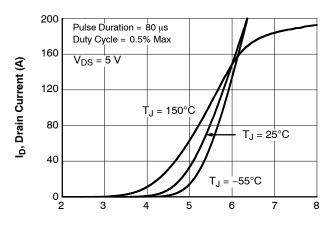


T_J, Junction Temperature (°C)



V_{GS}, Gate to Source Voltage (V)

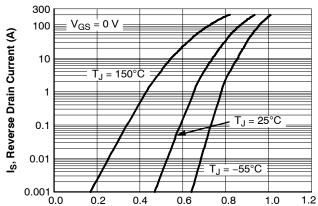
Figure 3. Normalized On–Resistance vs. Junction Temperature



V_{GS}, Gate to Source Voltage (V)

Figure 5. Transfer Characteristics

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



V_{SD}, Body Diode Forward Voltage (V)

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

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)(continue)

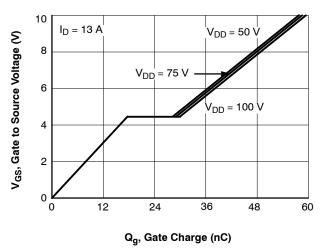
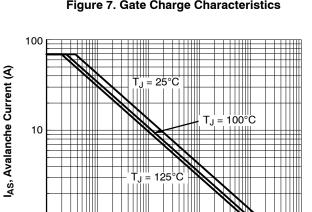


Figure 7. Gate Charge Characteristics



t_{AV}, Time in Avalanche (ms)

10

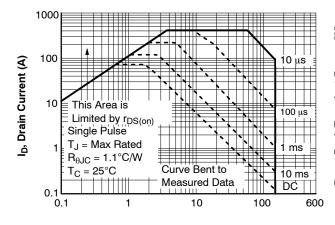
100

1000

0.01

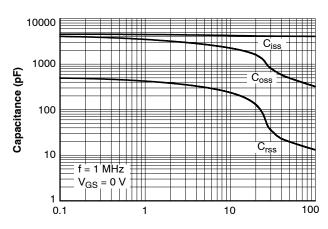
0.1

Figure 9. Unclamped Inductive Switching Capability



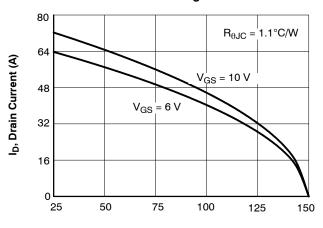
V_{DS}, Drain to Source Voltage (V)

Figure 11. Forward Bias Safe Operating Area



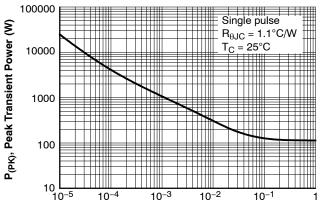
V_{DS}, Drain to Source Voltage (V)

Figure 8. Capacitance vs. Drain to Source Voltage



T_C, Case Temperature (°C)

Figure 10. Maximum Continuous Drain Current vs. Case Temperature



t, Pulse Width (s)

Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)(continued)

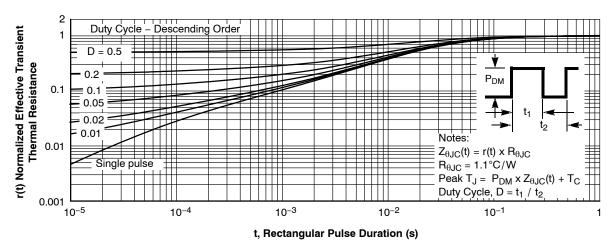


Figure 13. Junction-to-Case Transient Thermal Response Curve

ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Shipping [†]
5H	FDMT800152DC	PQFN8 8X8, 2P, DUAL COOL 88	13"	13.3 mm	3,000 / Tape & Reel

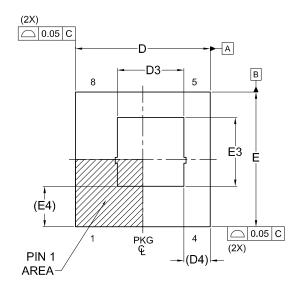
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

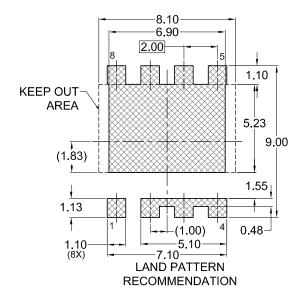




PQFN8 8X8, 2P CASE 483AQ ISSUE B

DATE 24 OCT 2022





TOP VIEW

SEE DETAIL A

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRW/D.

FRONT VIEW 0.10M C A B e1 .05(M) C е b (8X) (8X) -(L1) PIN #1 IDENT NOTES: e2 E5 E2 e3 (4X) E6 (z)(4X)D2 **BOTTOM VIEW**

		Å
(A3) - '	A1-	C
	DETAIL A SCALE: 2X	PLANE

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.

- 2. CONTROLLING DIMENSION: MILLIMETERS
- 3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
- 4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
- SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
- 6. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

DIM	MILLIMETERS				
Diw	MIN.	NOM.	MAX.		
Α	0.75	0.85	0.95		
A1	0.00	-	0.05		
A3	Ü).25 REF			
b	0.90	1.00	1.10		
D	7.90	8.00	8.10		
D2	6.80	6.90	7.00		
D3	3.68	3.86	4.03		
D4	1.56 REF				
Е	7.90	8.00	8.10		
E2	5.13	5.23	5.33		
E3	3.99	4.09	4.19		
E4	2.41 REF				
E5	0.35 REF				
E6		0.60 REF	=		
е	- 2	2.00 BSC	;		
e1	6.00 BSC				
e2	1.20 BSC				
e3	2.78 BSC				
k	1.48	1.58	1.68		
L	0.50	0.60	0.70		
L1	0.20 REF				
Z	0.50 REF				

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DESCRIPTION:	PQFN8 8X8, 2P		PAGE 1 OF 1	

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