

Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency and to minimize switch node ringing of DC-DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$, fast switching speed and body diode reverse recovery performance.

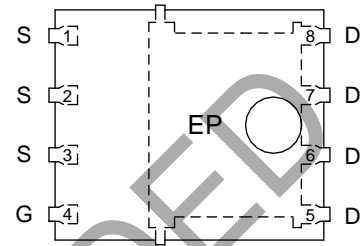
The AF15N50 is available in PDFN-5x6-8 package.

Features

- Typ $R_{DS(ON)}=14.32m\Omega$ @ $V_{GS}=10V$, $I_D=15A$
- Typ $R_{DS(ON)}=16.36m\Omega$ @ $V_{GS}=4.5V$, $I_D=15A$
- RoHS Compliant

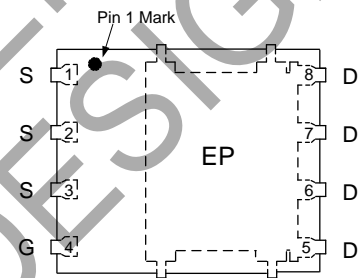
Pin Assignments

(Top View)



PDFN-5x6-8 (Option 1)

(Top View)



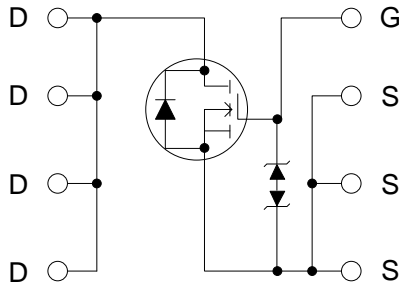
PDFN-5x6-8 (Option 2)

Applications

- Primary Switch in Isolated DC-DC
- Synchronous Rectifier
- Load Switch

NOT RECOMMENDED FOR NEW DESIGN

Internal Structure



Absolute Maximum Ratings (Note 1, $T_C = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Value	Unit
V_{DS}	Drain to Source Voltage	50	V
I_D	Continuous Drain Current	$T_C = +25^\circ\text{C}$	15
		$T_C = +100^\circ\text{C}$	15
I_{DM}	Pulsed Drain Current	60	A
V_{GS}	Gate to Source Voltage	± 12	V
P_D	Power Dissipation	31	W
T_{OP}	Operating Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Condition	Value	Unit
θ_{JA}	Thermal Resistance (Note 2)	Junction to Ambient	50	$^\circ\text{C/W}$
θ_{JC}	Thermal Resistance	Junction to Case	4	$^\circ\text{C/W}$

Note 2: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square pad.

Electrical Characteristics ($T_C = +25^\circ\text{C}$, unless otherwise specified.)

Static Characteristics

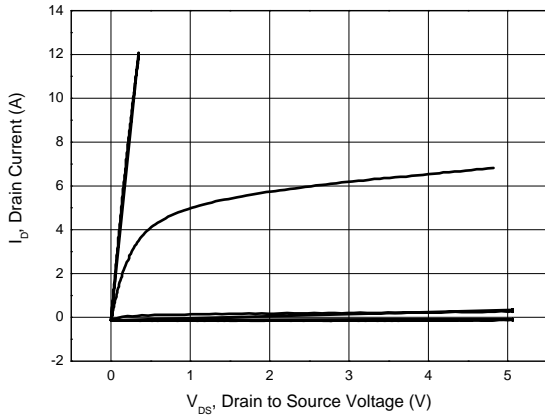
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
$V_{DSS(BR)}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=0.25mA$	50	–	–	V
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=0.25mA$	0.5	0.9	2	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=50V, V_{GS}=0V$	–	–	1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS}=10V, V_{DS}=0V$	–	–	± 10	μA
$R_{DS(ON)}$	Drain to Source On-state Resistance	$V_{GS}=10V, I_D=15A$	10	14.32	20	m Ω
		$V_{GS}=4.5V, I_D=15A$	12	16.36	30	

Dynamic Characteristics

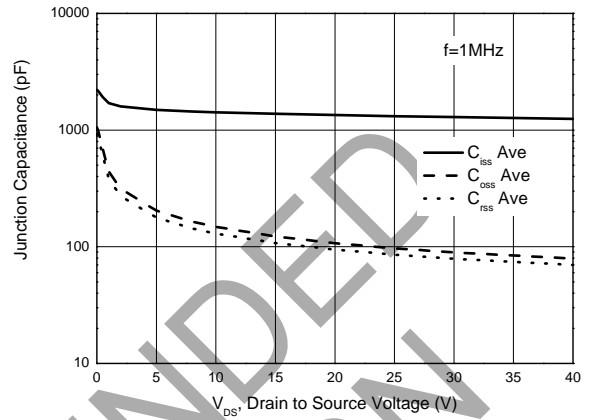
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=18V, f=1MHz$	–	1350	–	pF
		$V_{GS}=0V, V_{DS}=25V, f=1MHz$	–	1316	–	
C_{oss}	Output Capacitance	$V_{GS}=0V, V_{DS}=18V, f=1MHz$	–	110	–	pF
		$V_{GS}=0V, V_{DS}=25V, f=1MHz$	–	97	–	
C_{rss}	Reverse Transfer Capacitance	$V_{GS}=0V, V_{DS}=18V, f=1MHz$	–	95	–	pF
		$V_{GS}=0V, V_{DS}=25V, f=1MHz$	–	85	–	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS}=10V, I_D=15A, V_{DD}=25V, R_G=6\Omega$	–	4.162	–	ns
t_r	Rise Time		–	14.85	–	
$t_{d(off)}$	Turn-off Delay Time		–	35.452	–	
t_f	Fall Time		–	31.108	–	
Q_{gs}	Gate to Source Charge	$V_{GS}=0V \text{ to } 10V, V_{DD}=25V, I_D=15A$	–	3.2	–	nC
Q_{gd}	Gate to Drain Charge (Miller Charge)		–	5.7	–	
Q_g	Total Gate Charge		–	15.2	–	
R_g	Gate Resistance	–	–	0.85	–	Ω

Performance Characteristics ($T_C = +25^\circ\text{C}$, unless otherwise noted.)

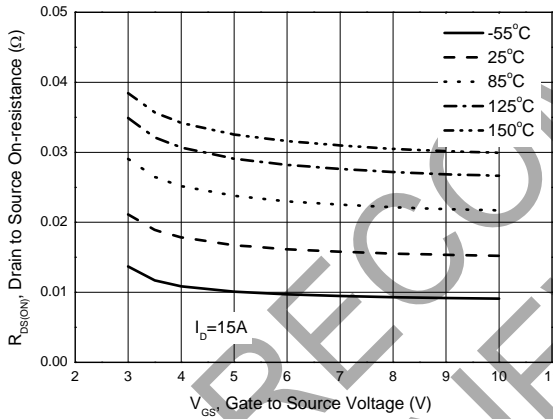
On Region Characteristics



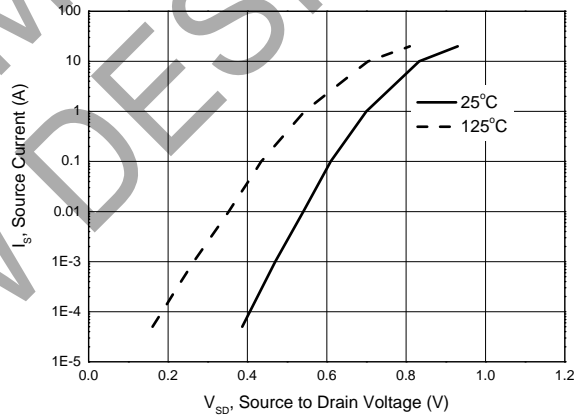
Typical Junction Capacitance



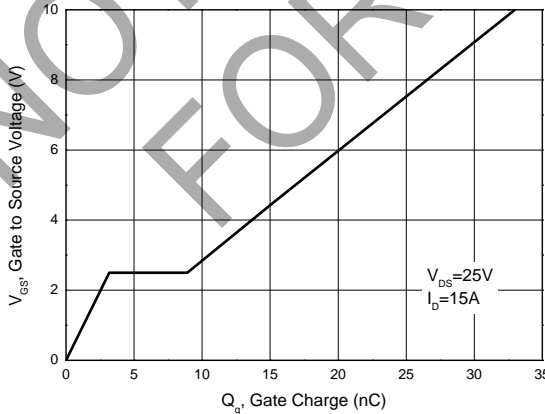
Typical Transfer Characteristics



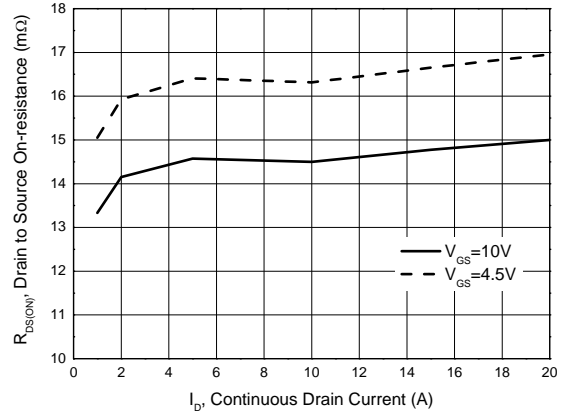
Source to Drain Diode Forward Voltage



Gate Charge Characteristics

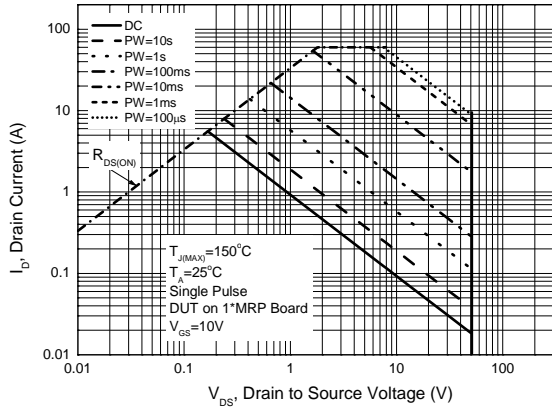


$R_{DS(ON)}$ vs. Continuous Drain Current

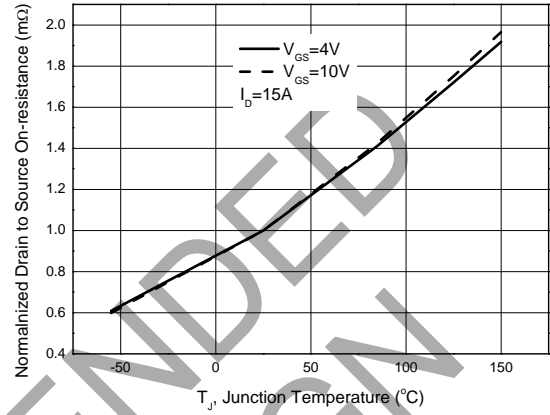


Performance Characteristics (Cont. $T_C = +25^\circ\text{C}$, unless otherwise noted.)

SOA, Safe Operation Area

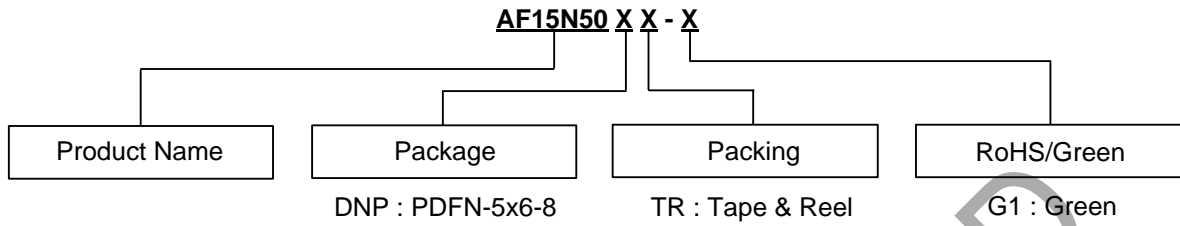


Normalized On-resistance vs. T_J



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Ordering Information

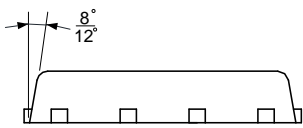
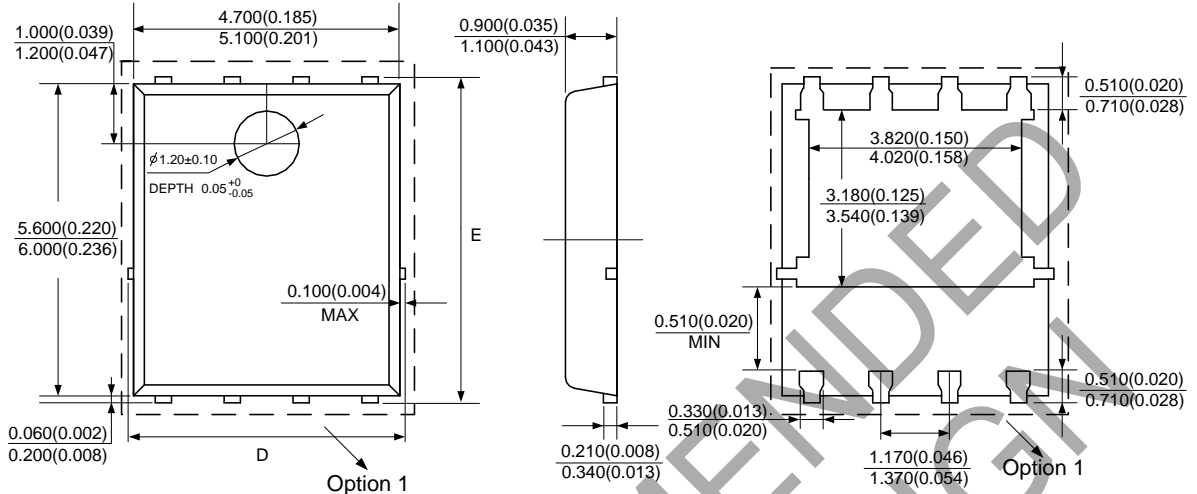


Package	Part Number	Marking ID	Packing
PDFN-5x6-8	AF15N50DNPTR-G1	15N50DNP-G1	Tape & Reel

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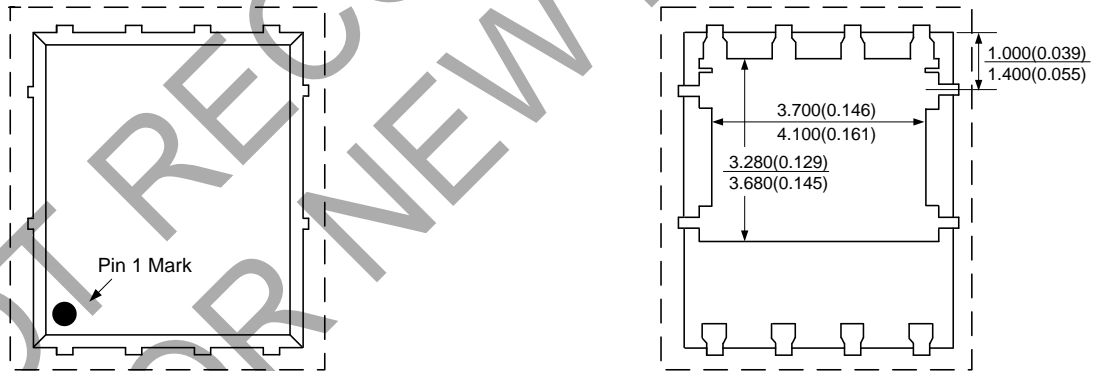
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: PDFN-5x6-8



Symbol	D				E			
	min(mm)	max(mm)	min(inch)	max(inch)	min(mm)	max(mm)	min(inch)	max(inch)
Option 1	--	5.100	--	0.201	5.900	6.100	0.232	0.240
Option 2	5.150(BSC)		0.203(BSC)		6.150(BSC)		0.242(BSC)	

Option 2



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