

50V N-Channel MOSFET**AF15N50****General 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-5×6-8 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

Applications

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

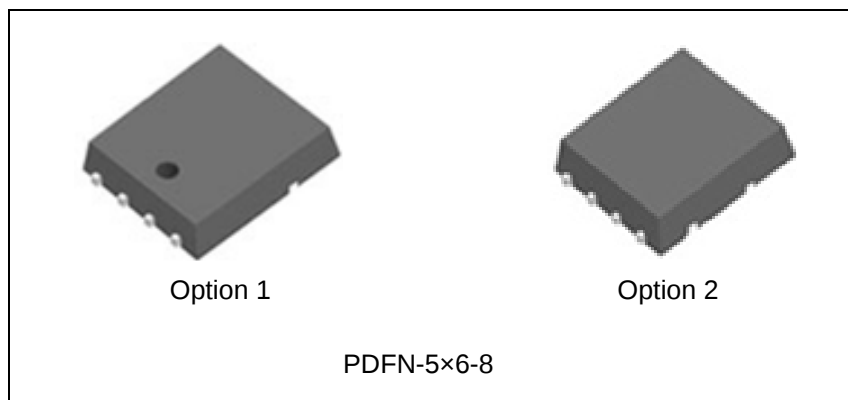


Figure 1. Package Type of AF15N50

50V N-Channel MOSFET

AF15N50

Pin Configuration

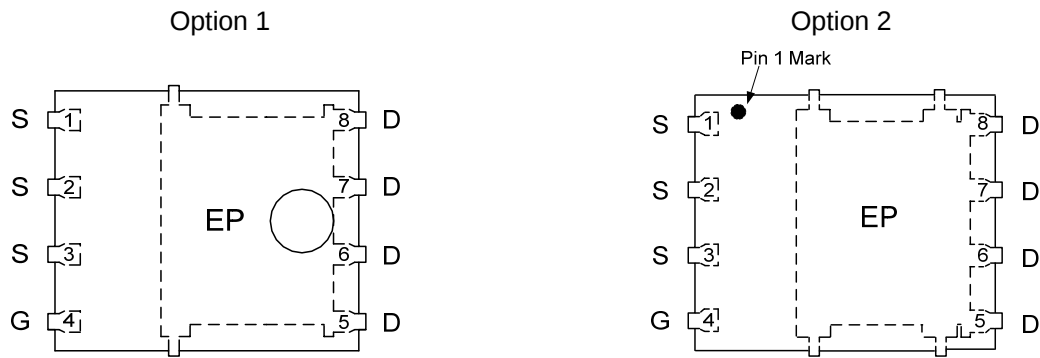
DNP Package
(PDFN-5×6-8)


Figure 2. Pin Configuration of AF15N50 (Top View)

Internal Structure

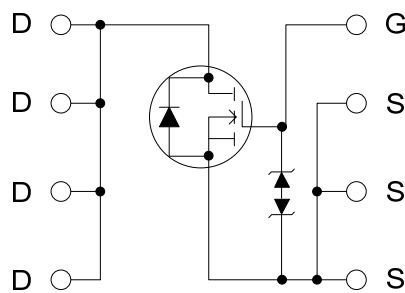
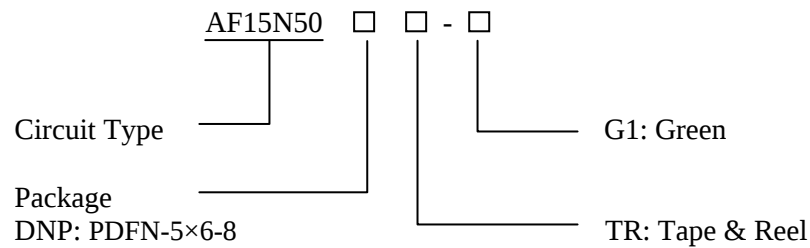


Figure 3. Internal Structure of AF15N50

**50V N-Channel MOSFET****AF15N50****Ordering Information**

Package	Part Number	Marking ID	Packing Type
PDFN-5×6-8	AF15N50DNPTR-G1	15N50DNP-G1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "G1" suffix in the part number, are RoHS compliant and green.

Absolute Maximum Ratings (Note 1)

T_C=25°C, unless otherwise specified.

Parameter	Symbol	Value		Unit
Drain to Source Voltage	V _{DS}	50		V
Continuous Drain Current	I _D	T _C =25°C	15	A
		T _C =100°C	15	
Pulsed Drain Current	I _{DM}	60		A
Gate to Source Voltage	V _{GS}	±12		V
Power Dissipation	P _D	31		W
Operating Temperature Range	T _{OP}	-55 to 150		°C
Storage Temperature Range	T _{STG}	-55 to 150		°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.

**50V N-Channel MOSFET****AF15N50****Recommended Operating Conditions**

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

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

**50V N-Channel MOSFET****AF15N50****Electrical Characteristics (Continued)** $T_C=25^{\circ}\text{C}$, unless otherwise specified.**Dynamic Characteristics**

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

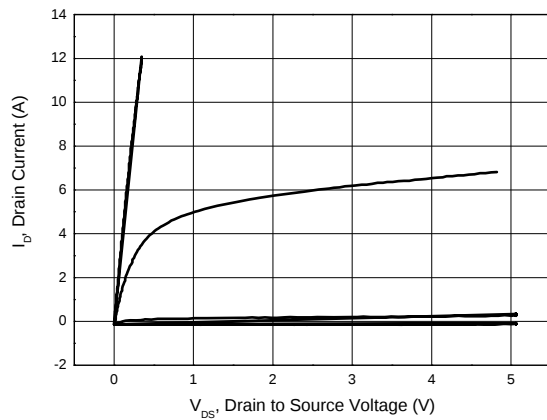
**50V N-Channel MOSFET****AF15N50****Typical Performance Characteristics** $T_C=25^{\circ}\text{C}$, unless otherwise noted.

Figure 4. On Region Characteristics

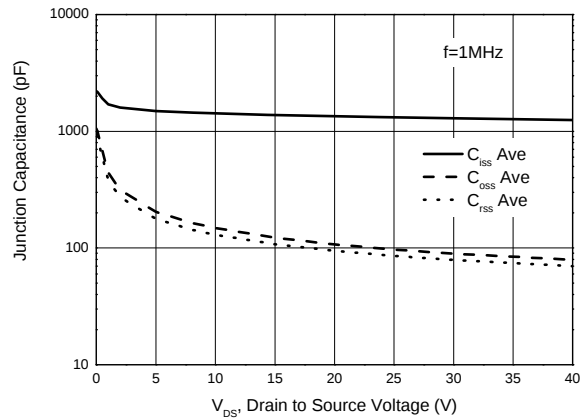


Figure 5. Typical Junction Capacitance

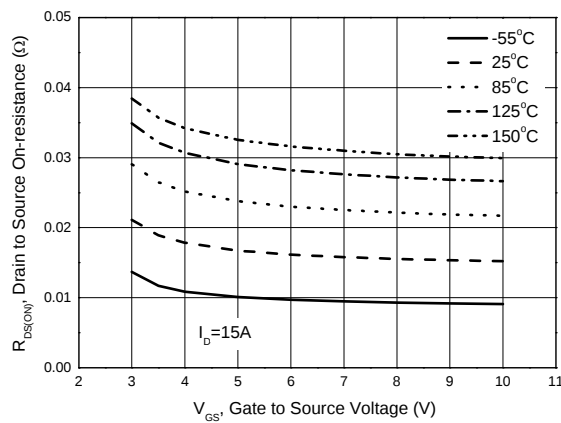


Figure 6. Typical Transfer Characteristics

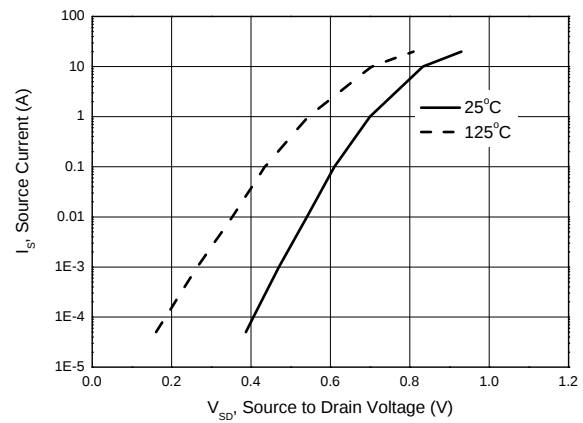


Figure 7. Source to Drain Diode Forward Voltage

50V N-Channel MOSFET

AF15N50

Typical Performance Characteristics

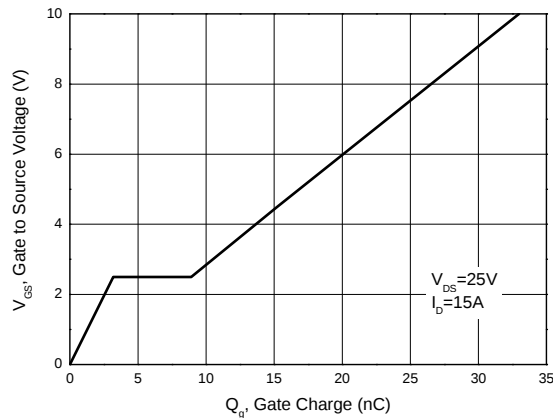
 $T_C = 25^\circ\text{C}$, unless otherwise noted.


Figure 8. Gate Charge Characteristics

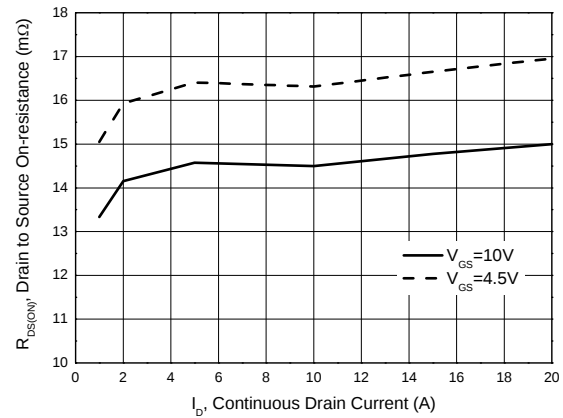
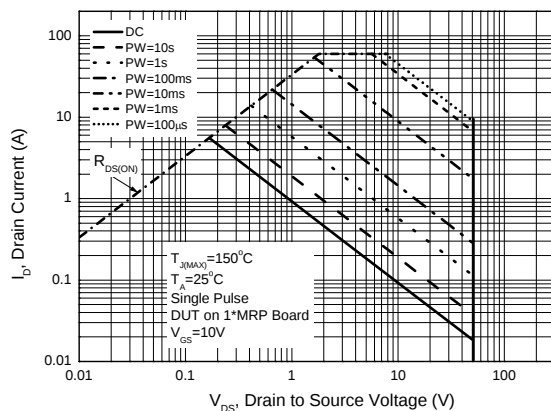
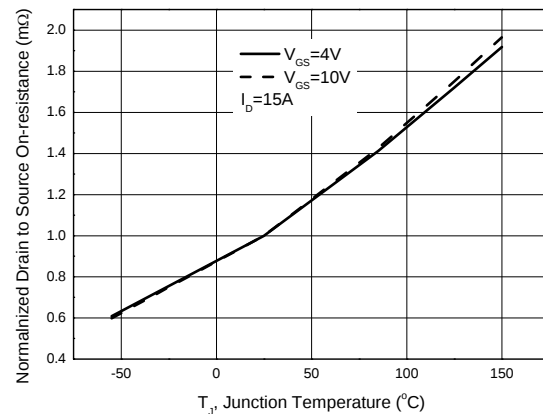

Figure 9. $R_{DS(ON)}$ vs. Continuous Drain Current


Figure 10. SOA, Safe Operation Area


Figure 11. Normalized On-resistance vs. T_J

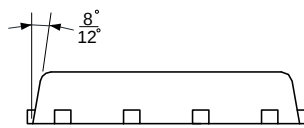
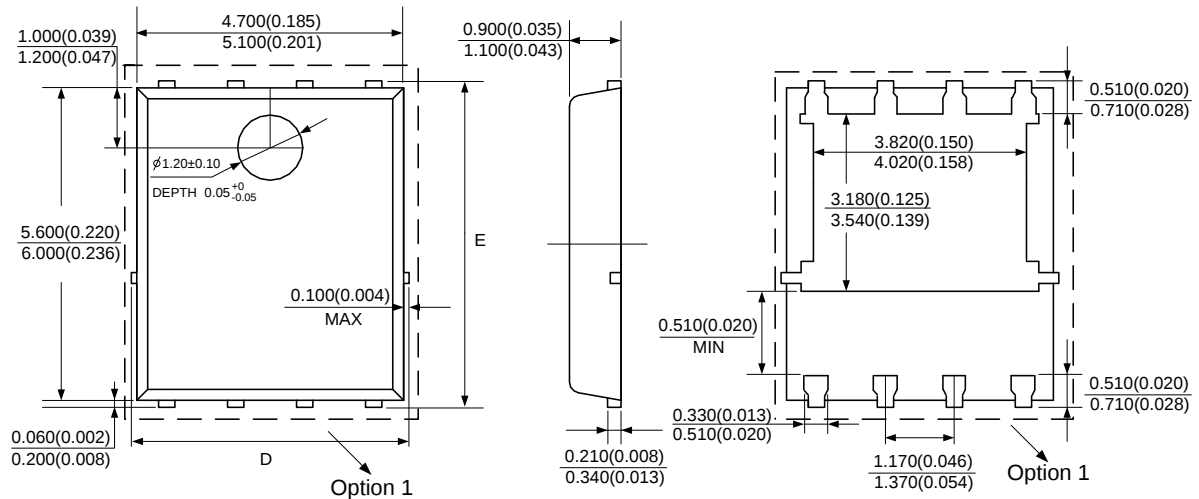
50V N-Channel MOSFET

AF15N50

Mechanical Dimensions

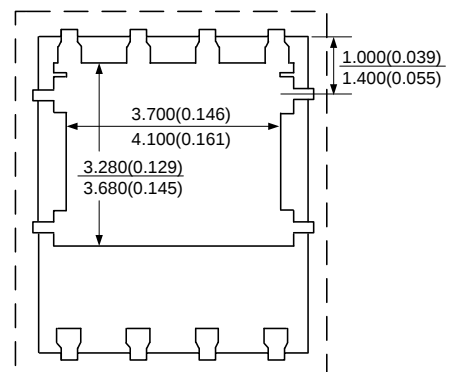
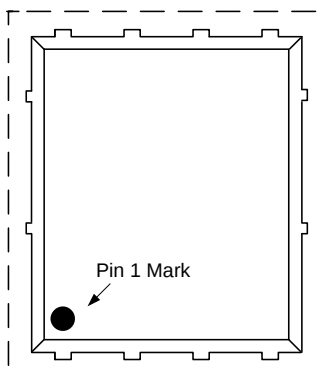
PDFN-5×6-8

Unit: mm(inch)



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





BCD Semiconductor Manufacturing Limited

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