

# FMD7N60P5

# N-CHANNEL POWER MOSFET

### Features :

- Fast body diode eliminates the need for external diode in ZVS applications.
- Lower gate charge results in simpler drive requirements
- Higher gate voltage threshold offers improved noise immunity
- Low on-resistance
- RoHS compliant

$V_{DSS}$	600	V
$I_D$	7	A
$T_{rr}$	198	ns
$R_{DS(ON)Typ}$	1.1	$\Omega$

### Applications:

- Motor control
- Uninterruptible power supplies
- Zero voltage switching SMPS



### Absolute ( $T_c = 25^\circ\text{C}$ ):

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	600	V
$I_D$	Continuous Drain Current	7*	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	4.8*	A
$I_{DM}\text{①}$	Pulsed Drain Current	28*	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}\text{②}$	Single Pulse Avalanche Energy	440	mJ
$E_{AR}\text{①}$	Avalanche Energy, Repetitive	50	mJ
$I_{AR}\text{①}$	Avalanche Current	3.3	A
$P_D$	Power Dissipation	40	W
$dv/dt$	Peak Diode Recovery $dv/dt$	5	V/ns
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$

\*: Drain current limited by maximum junction temperature

### Ordering Information

Product number	Package	Marking	Packing	Quantity
FMD7N60P5	TO252	FMD7N60P5	Tape & Reel	2500

**Electronic Characteristics (Tc=25°C)**

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	600			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I <sub>D</sub> =250uA, Referenced to 25°C		0.6		V/°C
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	2.0		4.0	V
Drain-source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			1	μA
		V <sub>DS</sub> =480V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			100	μA
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =3.5A ③		7		S
Gate-body Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±100	nA
Drain-source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A ③		1.1	1.5	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V F = 1.0MHZ		1050		pF
Output Capacitance	C <sub>oss</sub>			84		
Reverse transfer Capacitance	C <sub>rss</sub>			12		
Turn-on Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =7.0A R <sub>G</sub> =25Ω ③		17		ns
Rise Time	T <sub>r</sub>			20		
Turn -Off Delay Time	T <sub>d(off)</sub>			39		
Fall Time	T <sub>f</sub>			18		
Total Gate Charge	Q <sub>g</sub>	I <sub>D</sub> =7.0A, V <sub>DS</sub> = 480V V <sub>GS</sub> = 10V ③		21		nC
Gate-to-Source Charge	Q <sub>gs</sub>			4.8		nC
Gate-to-Drain Charge	Q <sub>gd</sub>			6.5		nC
Continuous Diode Forward Current	I <sub>s</sub>				7.0	A
Max Pulsed Diode Forward Current	I <sub>SM</sub>				28	A
Diode Forward Voltage	V <sub>SD</sub>	T <sub>J</sub> =25°C, I <sub>s</sub> =7.0A, V <sub>GS</sub> =0V ③			1.4	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>f</sub> =7.0A di/dt=100A/μs ③		198		ns
Reverse Recovery Charge	Q <sub>rr</sub>				0.5	
Thermal Resistance Junction-case	R <sub>thJC</sub>			3.13		°C/W
Thermal Resistance Junction-ambient	R <sub>thJA</sub>			62.5		°C/W

**Notes:**

- ① Repetitive rating: Pulse width limited by maximum junction temperature  
 ② Starting T<sub>J</sub>=25°C, V<sub>DD</sub> =50V, L=18mH, R<sub>G</sub> =25Ω, I<sub>AS</sub>=7.0A  
 ③ Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

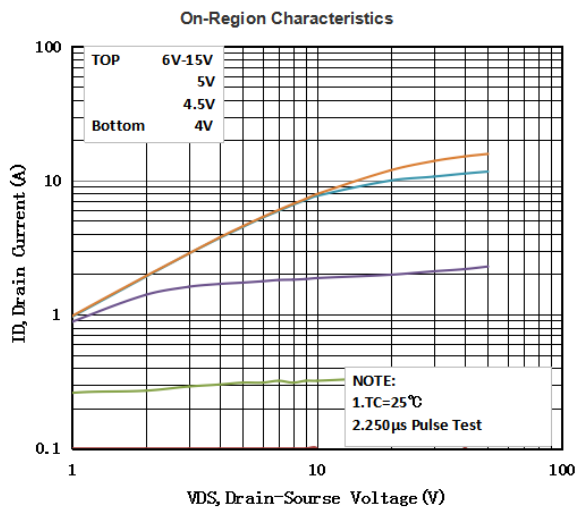


Fig.1 Typical Output Characteristics, Tc=25°C

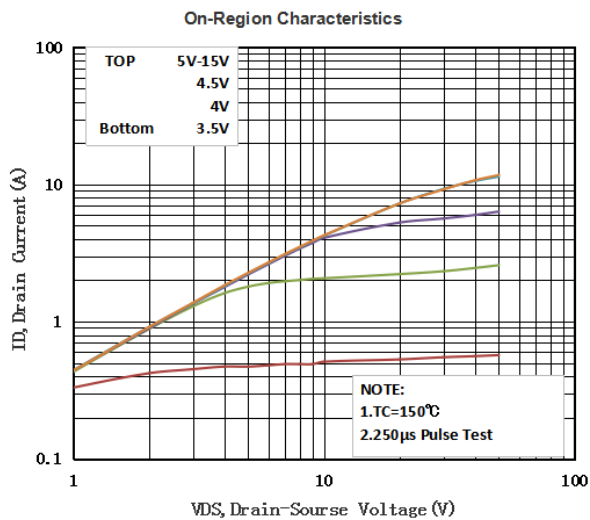


Fig.2 Typical Output Characteristics, Tc=150°C

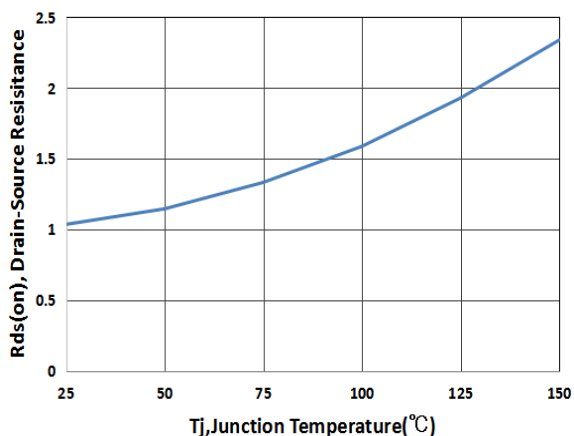


Fig.3 On-Resistance vs. Temperature

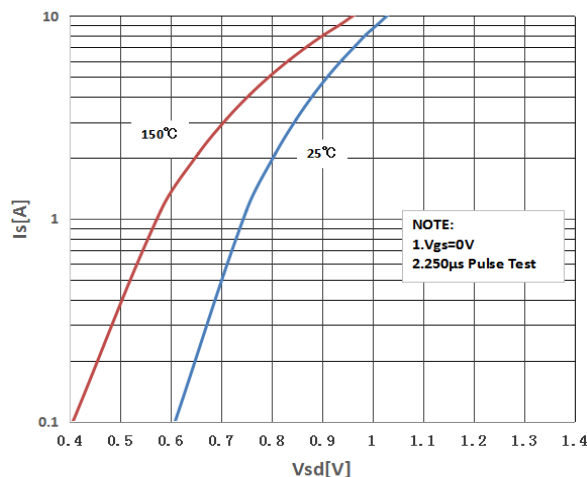


Fig.4 Typical Source-Drain Diode Forward Voltage

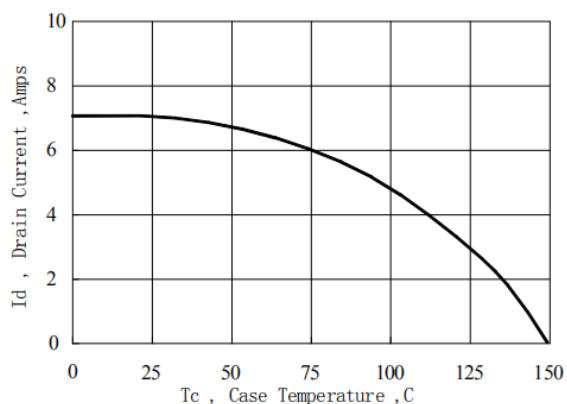


Fig.5 Maximum Drain Current vs. Case Temperature

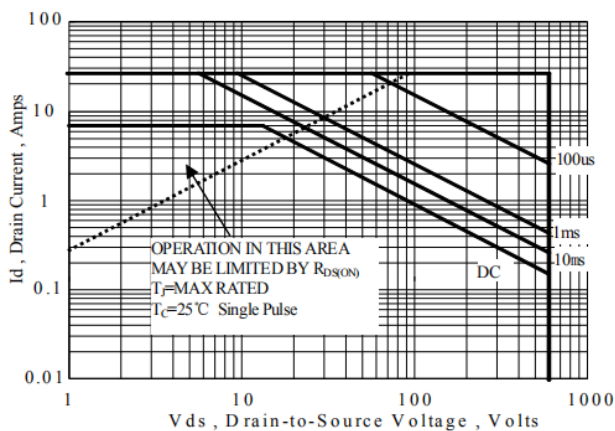


Fig.6 Maximum Safe Operating Area

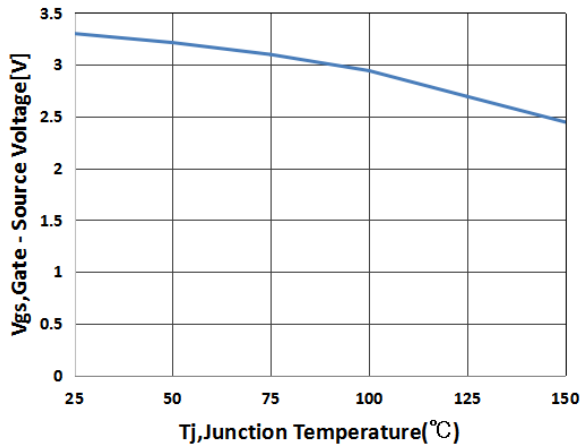


Fig.7 Gate Threshold Voltage vs. Temperature

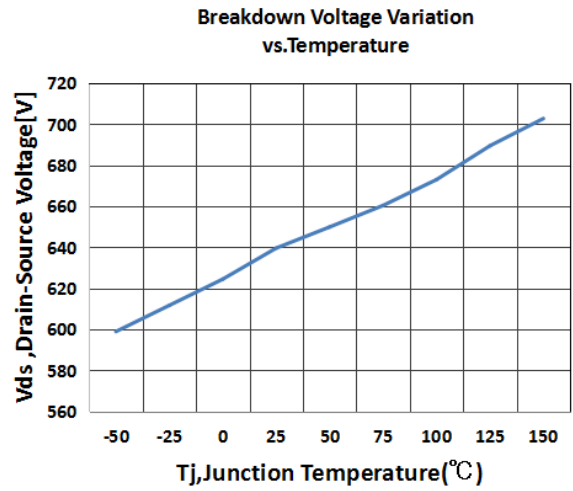


Fig.8 Breakdown Voltage vs. Temperature

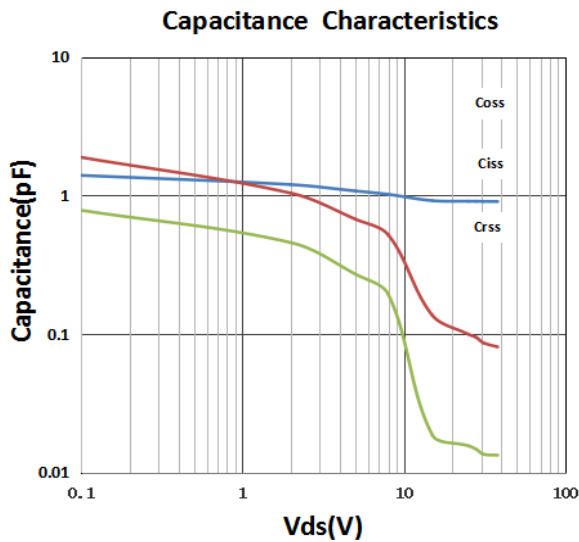


Fig.9 Capacitance Characteristics

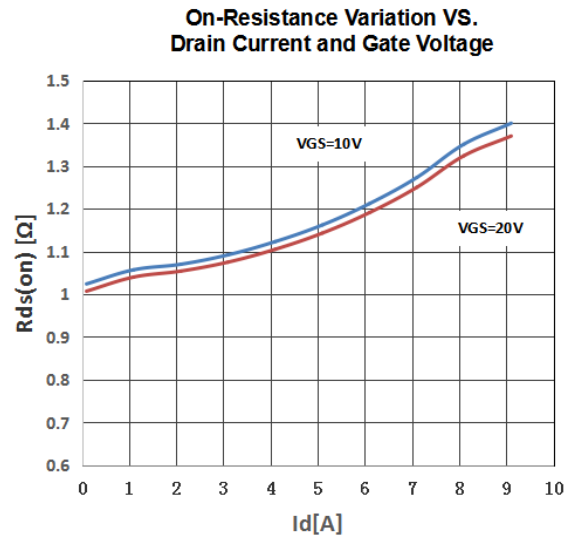


Fig.10 On-Resistance vs. Drain Current & Gate Voltage

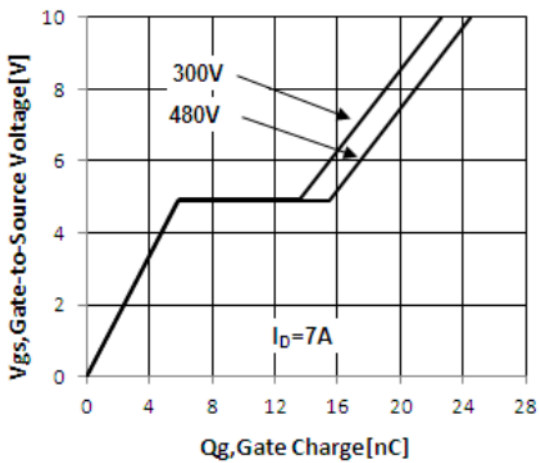
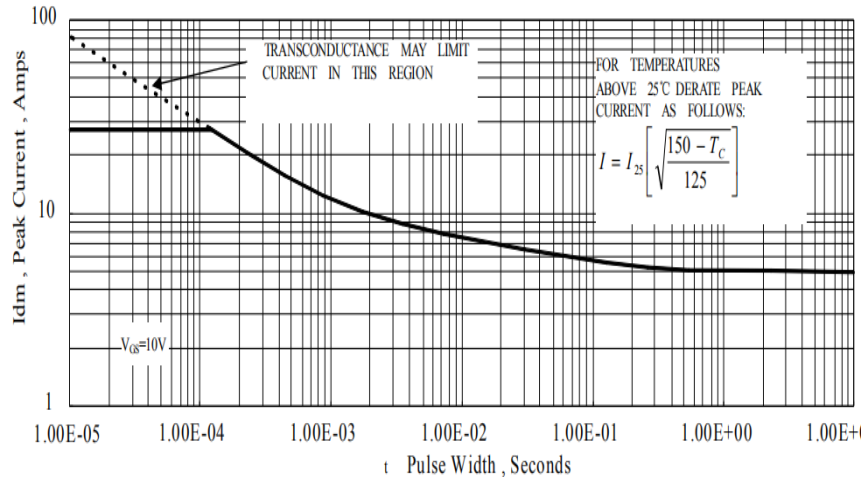
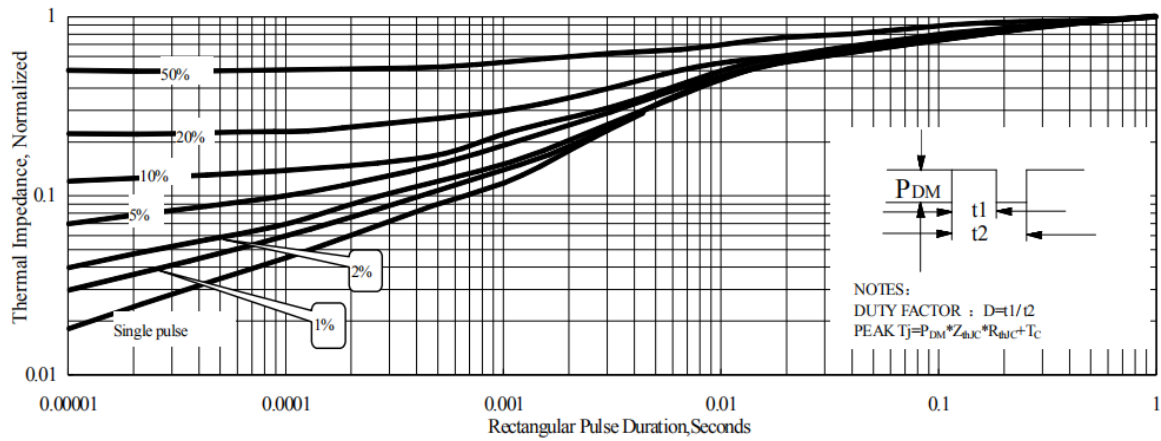


Fig.11 Gate Charge vs. Gate to Source Voltage


**Fig.12  $I_{DM}$  vs. Pulse Width**

**Fig.13 Normalized Thermal Impedence vs. Rectangular Pulse Duration**

**TO-220FP MECHANICAL DATA**

UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.40		4.95	e		2.54	
A <sub>1</sub>	2.30		2.90	L	12.50		14.30
b	0.45		0.90	L <sub>1</sub>	9.10		10.05
b <sub>1</sub>	1.10		1.70	L <sub>2</sub>	15.00		16.00
c	0.35		0.90	L <sub>3</sub>	3.00		4.00
D	14.50		17.00	øp	3.00		3.50
D1	6.10		9.00	Q	2.30		2.80
E	9.60		10.30				

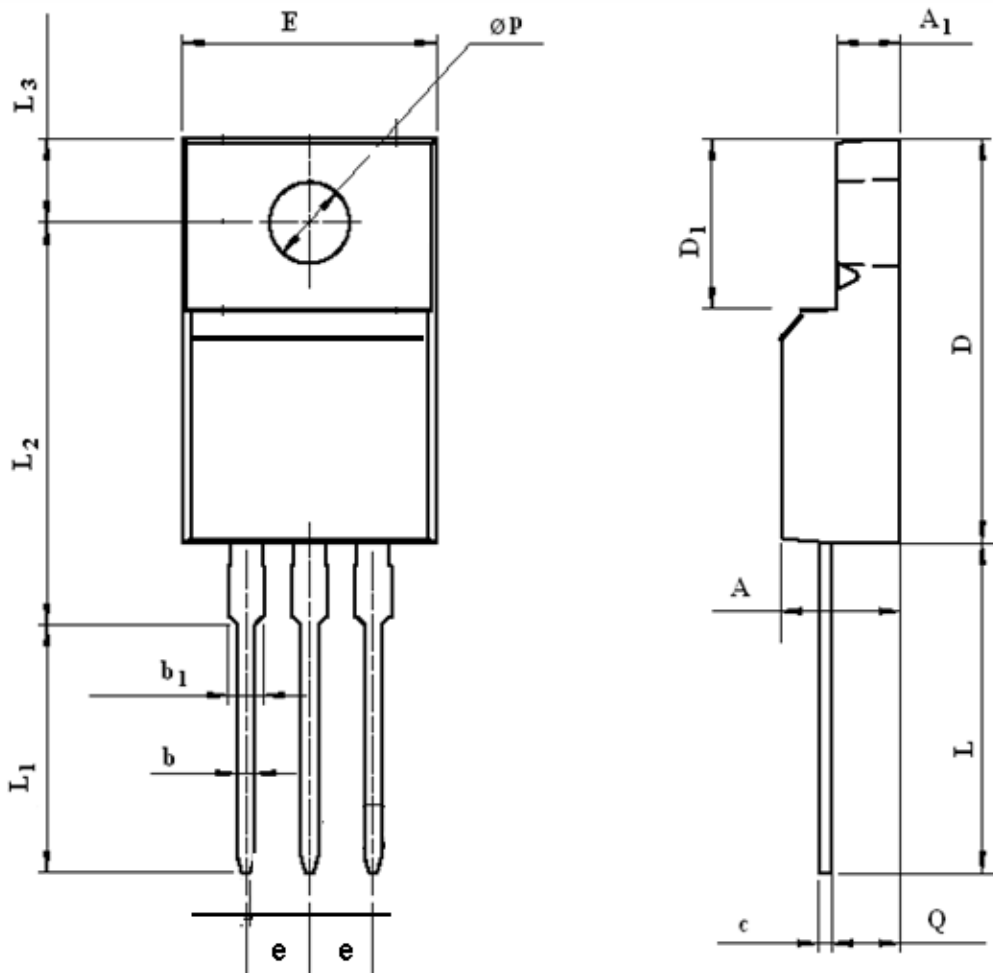


Fig.14 Dimension of Package

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