

# FMD7N60E5

# N-CHANNEL POWER MOSFET

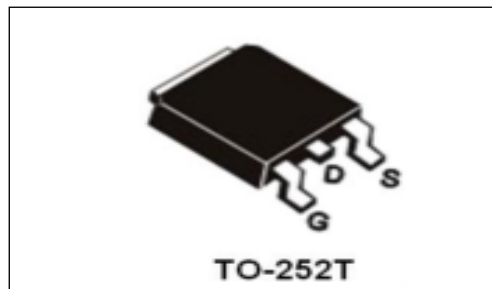
### Features :

- 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
$I_{DM}$ ①	Pulsed Drain Current	28*	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$ ②	Single Pulse Avalanche Energy	440	mJ
$E_{AR}$ ①	Avalanche Energy, Repetitive	50	mJ
$I_{AR}$ ①	Avalanche Current	3.3	A
$P_D$	Power Dissipation	96	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 is limited by maximum junction temperature

### Ordering Information

Product number	Package	Marking	Packing	Quantity
FMD7N60E5	TO252T	FMD7N60E5	Tape & Reel	2500

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

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	600			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_j$	$I_D=250\mu A$ , Referenced to 25°C		0.6		V/°C
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2		4	V
Drain-source Leakage Current	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V, T_j=25^\circ C$			1	$\mu A$
		$V_{DS}=480V, V_{GS}=0V, T_j=125^\circ C$			100	$\mu A$
Forward Transconductance	$g_{fs}$	$V_{DS}=15V, I_D=3.5A$ ③		7		S
Gate-body Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$			$\pm 100$	nA
Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.5A$ ③		1.1	1.5	$\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V$ $F=1.0MHz$		1050		pF
Output Capacitance	$C_{oss}$			84		
Reverse transfer Capacitance	$C_{rss}$			12		
Turn-on Delay Time	$T_{d(on)}$	$V_{DD}=300V, I_D=7.0A$ $R_G=25\Omega$ ③		17		ns
Rise Time	$T_r$			20		
Turn -Off Delay Time	$T_{d(off)}$			39		
Fall Time	$T_f$			18		
Total Gate Charge	$Q_g$	$I_D=7.0A, V_{DS}=480V$ $V_{GS}=10V$ ③		21		nC
Gate-to-Source Charge	$Q_{gs}$			4.8		nC
Gate-to-Drain Charge	$Q_{gd}$			6.5		nC
Continuous Diode Forward Current	$I_S$				7	A
Max Pulsed Diode Forward Current	$I_{SM}$				28	A
Diode Forward Voltage	$V_{SD}$	$T_j=25^\circ C, I_S=7.0A, V_{GS}=0V$ ③			1.4	V
Reverse Recovery Time	$t_{rr}$	$T_j=25^\circ C, I_f=7.0A$ $di/dt=100A/\mu s$ ③		198		ns
Reverse Recovery Charge	$Q_{rr}$				0.5	
Thermal Resistance Junction-case	$R_{thJC}$			1.3		°C/W
Thermal Resistance Junction-ambient	$R_{thJA}$			62.5		°C/W

**Notes:**

- ① Repetitive rating: Pulse width is limited by the maximum junction temperature
- ② Starting  $T_j=25^\circ C, V_{DD}=50V, L=18mH, R_G=25\Omega, I_{AS}=7.0A$
- ③ Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

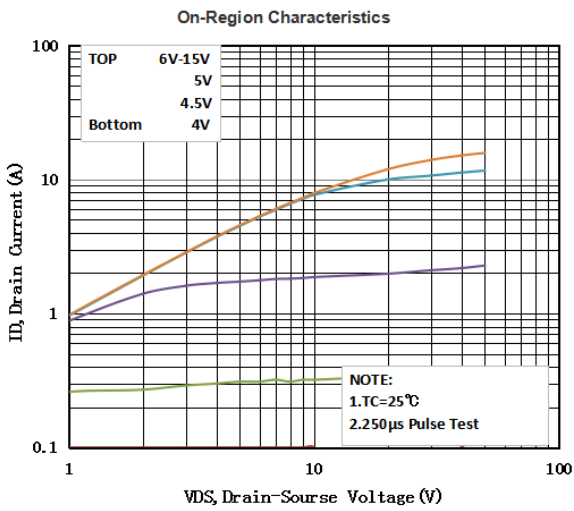
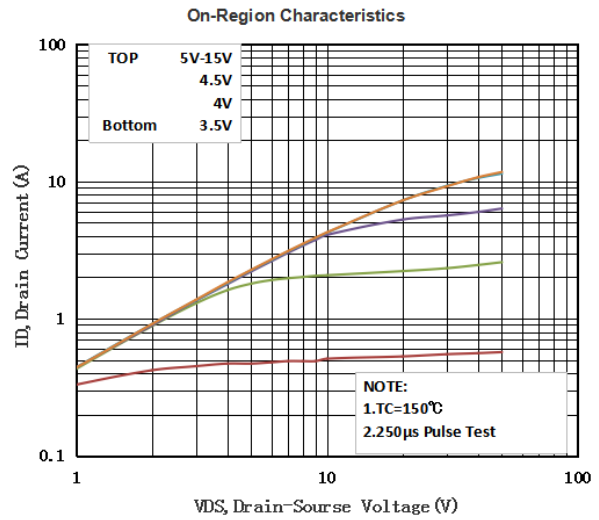
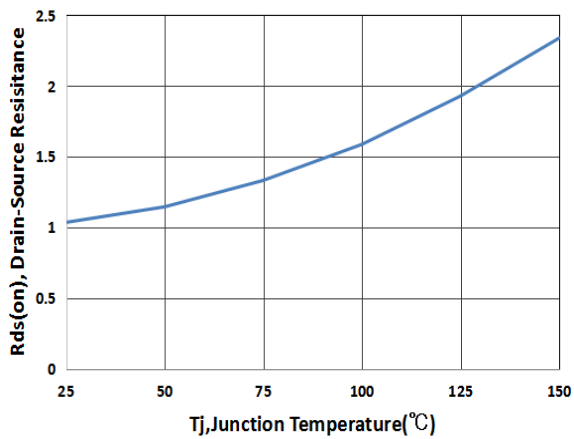

 Fig.1 Typical Output Characteristics,  $T_c=25^\circ\text{C}$ 

 Fig.2 Typical Output Characteristics,  $T_c=150^\circ\text{C}$ 


Fig.3 On-Resistance Vs. Temperature

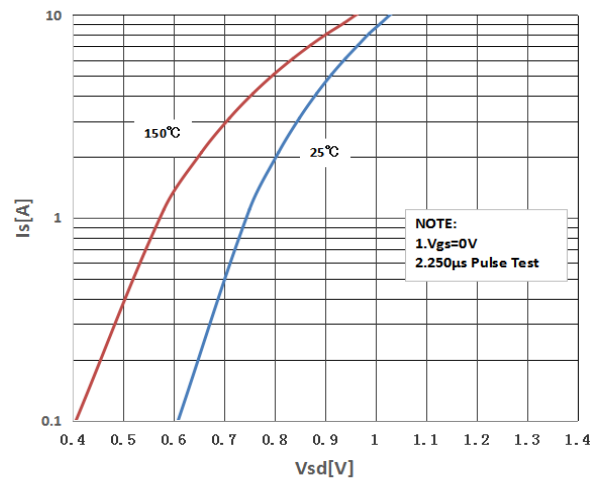


Fig.4 Typical Source-Drain Diode Forward Voltage

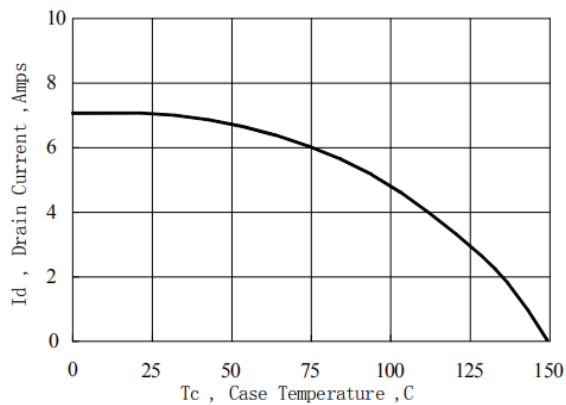


Fig.5 Maximum Drain Current Vs. Case Temperature

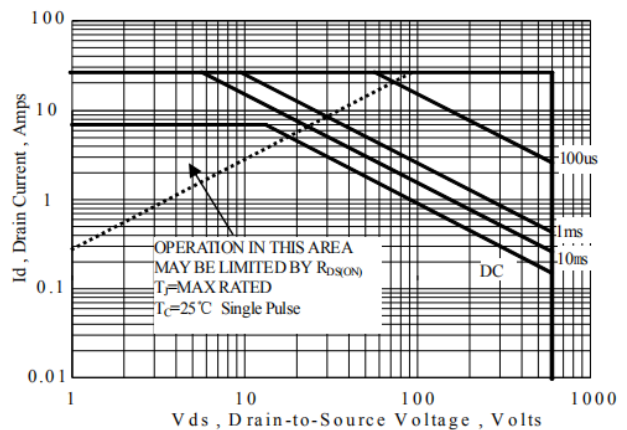


Fig.6 Maximum Safe Operating Area

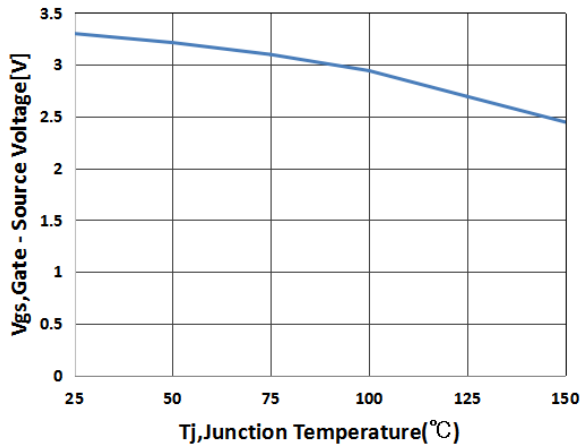


Fig.7 Gate Threshold Voltage Variation vs. Temperature

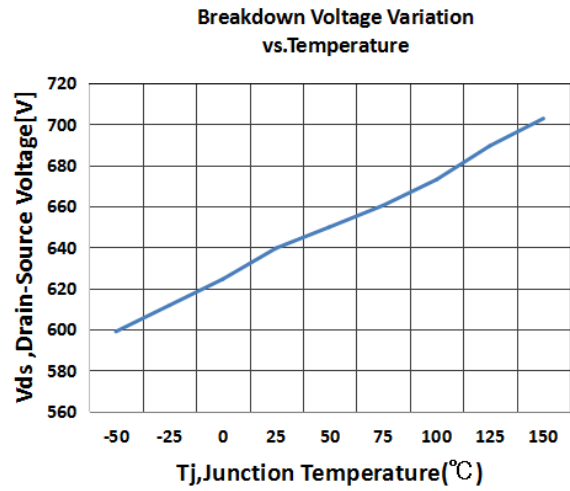


Fig.8 Breakdown Voltage Variation vs. Temperature

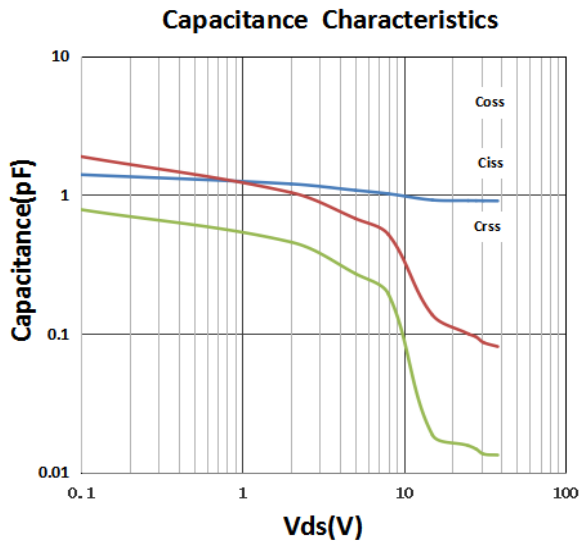


Fig.9 Capacitance Characteristics

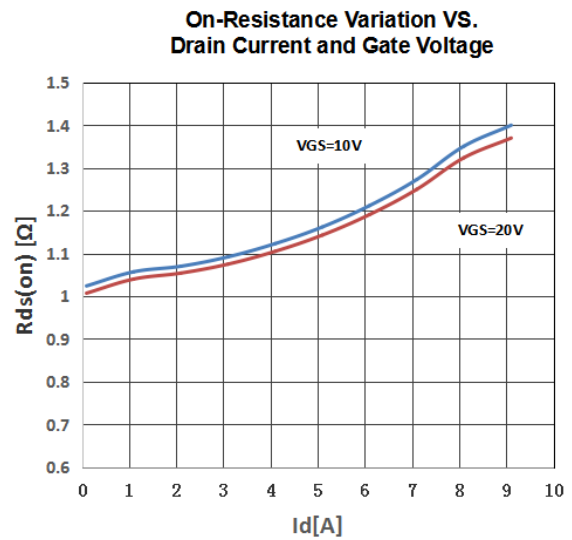


Fig.10 On-Resistance Variation VS. Drain Current and Gate Voltage

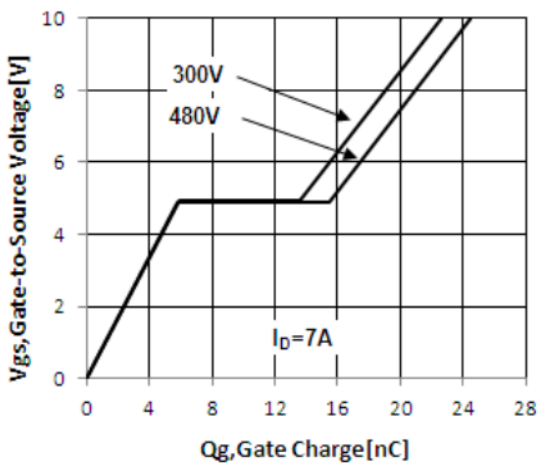
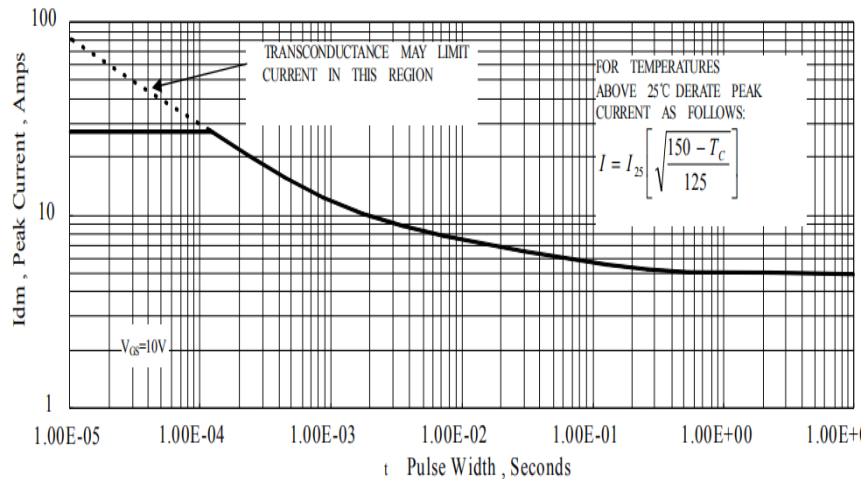
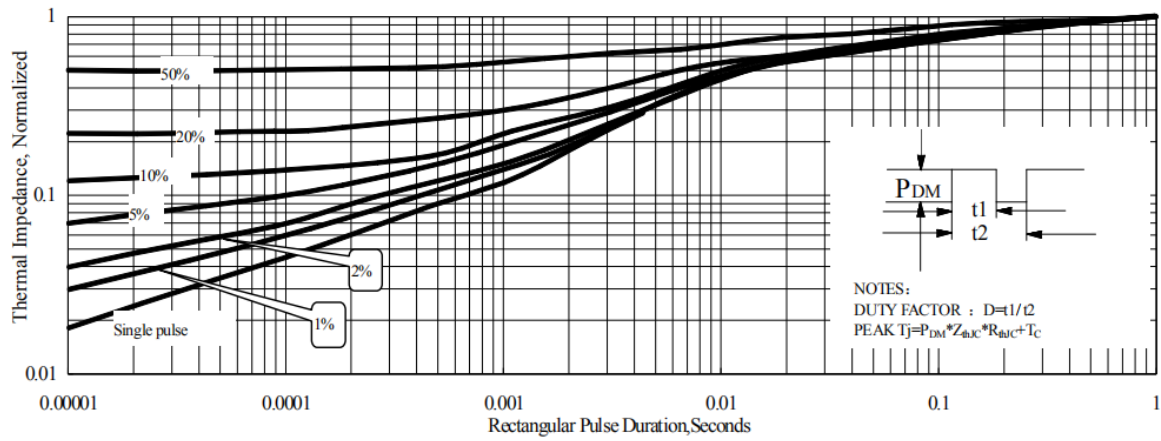
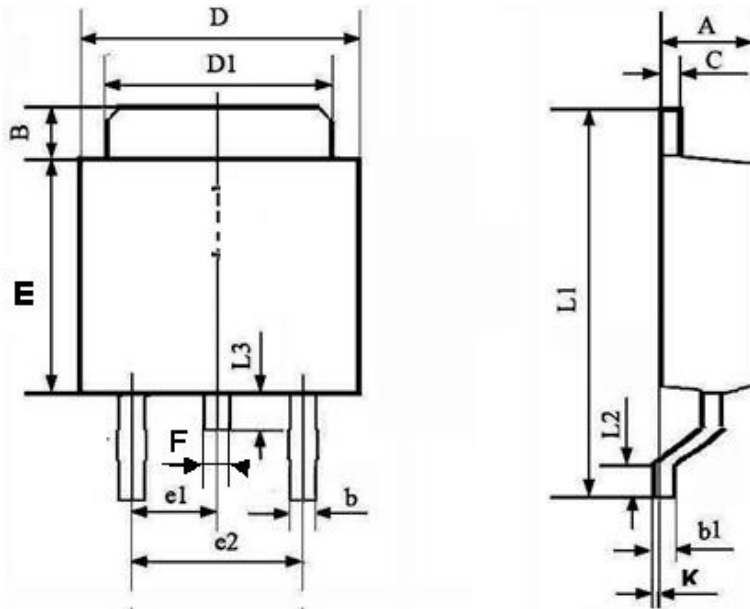


Fig.11 Gate Charge VS Gate to Source Voltage


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

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

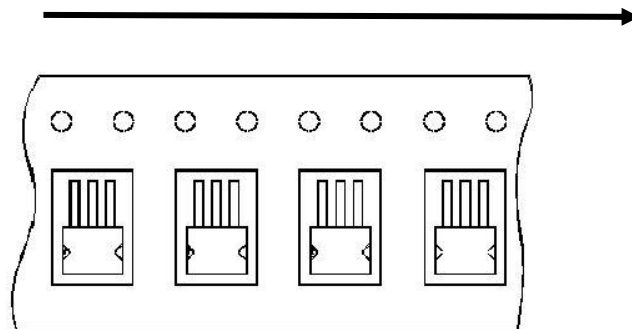
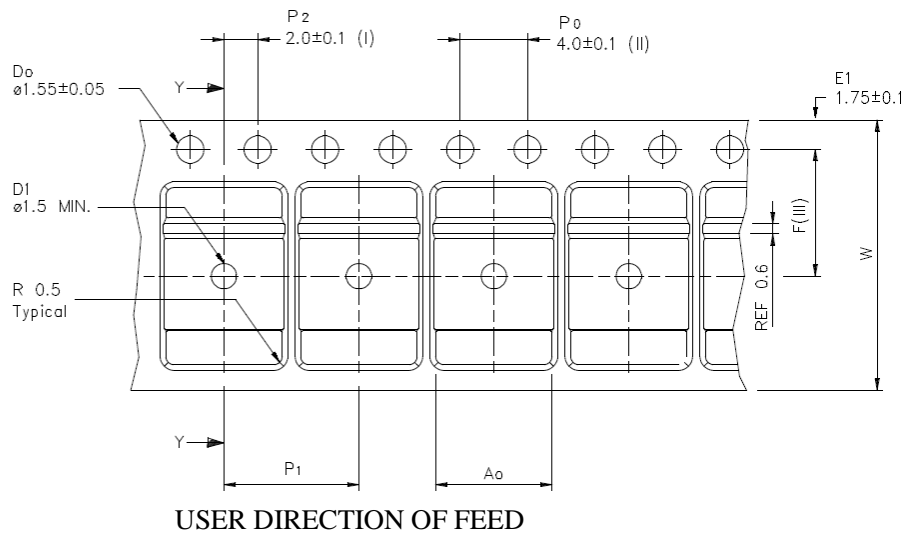
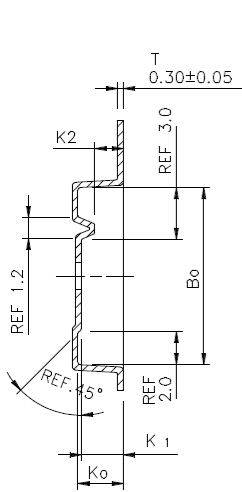
**TO-252T MECHANICAL DATA**
**UNIT: mm**

SYMBOL	min	max	SYMBOL	min	max
A	2.20	2.40	B	0.85	1.25
b	0.50	0.80	C	0.45	0.70
b1	0.45	0.70	D	6.30	6.70
D1	5.10	5.50	E	5.30	6.20
L1	9.20	10.60	F	0.50	0.90
L2	0.90	1.50	e1	2.25	2.35
L3	0.60	1.10	e2	4.50	4.70
			K	0.00	0.18



**TO-252T TAPE AND REEL DATA**
**UNIT: mm**

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A0	6.80	6.90	7.00	B0	10.40	10.50	10.60
K0	2.60	2.70	2.90	K1	2.40	2.50	2.60
F	7.40	7.50	7.60	K2	1.60	1.70	1.80
W	15.90	16.00	16.10	P1	7.90	8.00	8.10


**UNIT ORIENTATION**

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