MDD7N65D

650V N-Channel Enhancement Mode MOSFET

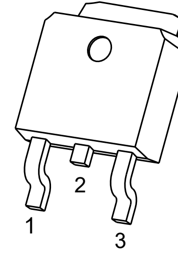
Description

- The Power MOSFET is fabricated using the advanced planer VDMOS technology. The resulting device has low conduction resistance, superior switching performance and high avalanche energy.

General Features

- RDS(ON) < 1.4 Ω@VGS = 10 V
- Ultra low gate charge
- Low reverse transfer Capacitance
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness

TO-252

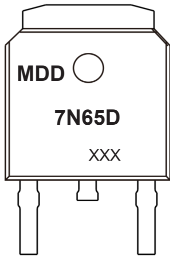


1. Gate
2. Drain
3. Source

Application

- High efeciency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- LED power supplies

Marking



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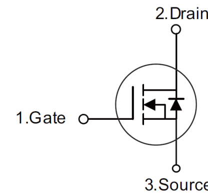
Equivalent Circuit



Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Avalanche Current (Note 2)		I_{AR}	7	A
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	29.6	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	530	mJ
Avalanche Energy	Repetitive (Note 2)	E_{AR}	14.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	120	W
Junction Temperature		T_J	150	℃
Storage Temperature		T_{stg}	-55 ~+150	℃

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 19.5mH, I_{AS} = 7.0A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C
4. I_{SD} ≤ 7.0A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J = 25°C

Ta = 25℃ unless otherwise specified

Symbol	Parameter		Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		V_{GS}=0V, I_D=250μA	650	--	--	V
I_{GSS}	Gate-Source Leakage Current	Forward	V_{GS}=30V, V_{DS}=0V	--	--	100	nA
		Reverse	V_{GS}=-30V, V_{DS}=0V	--	--	-100	nA
I_{DSS}	Drain-Source Leakage Current		V_{DS}=650V, V_{DS}=0V	--	--	1	uA
$V_{GS(TH)}$	Gate Threshold Voltage		V_{DS}=VGS, I_D=250μA	2.0	--	4.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance		V_{GS}=10V, I_D=3.5A	--	1.2	1.4	Ω
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient		I_D=250μA	--	0.67	--	V/℃

Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{DS}=25V V_{GS}=0V f=1MHz	--	--	1400	pF
C_{oss}	Output Capacitance		--	--	180	pF
C_{rss}	Reverse Transfer Capacitance		--	16	21	pF
Q_g	Total Gate Charge	VDS=520V, VGS=10V, ID=7.0A (Note1,2)	--	29	38	nC
Q_{gs}	Gate Source Charge		--	7	--	nC
Q_{gd}	Gate Drain Charge		--	14.5	--	nC

Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	VDS=325V, ID=7.4A, RG=25Ω (Note1,2)	--	--	70	ns
t_r	Turn on Rise Time		--	--	170	ns
$t_{d(off)}$	Turn Off Delay Time		--	--	140	ns
t_f	Turn Off Fall Time		--	--	130	ns

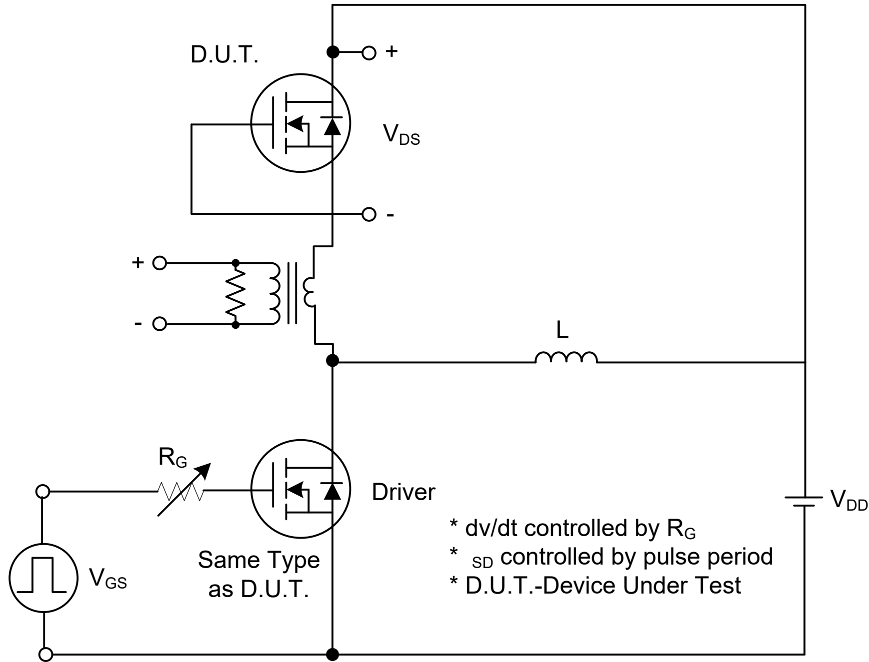
Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
I_{SD}	Source drain current(Body Diode)		--	--	7	A
I_{SM}	Pulsed Current		--	--	29.6	A
V_{SD}	Drain-Source Diode Forward Voltage	IS=7A, VGS=0V	--	--	1.4	V
t_{rr}	Body Diode Reverse Recovery Time	IS=7A, VGS=0V, dIs/dt=100A/μs	--	320	--	ns
Q_{rr}	Body Diode Reverse Recovery Charge		--	2.4	--	uC

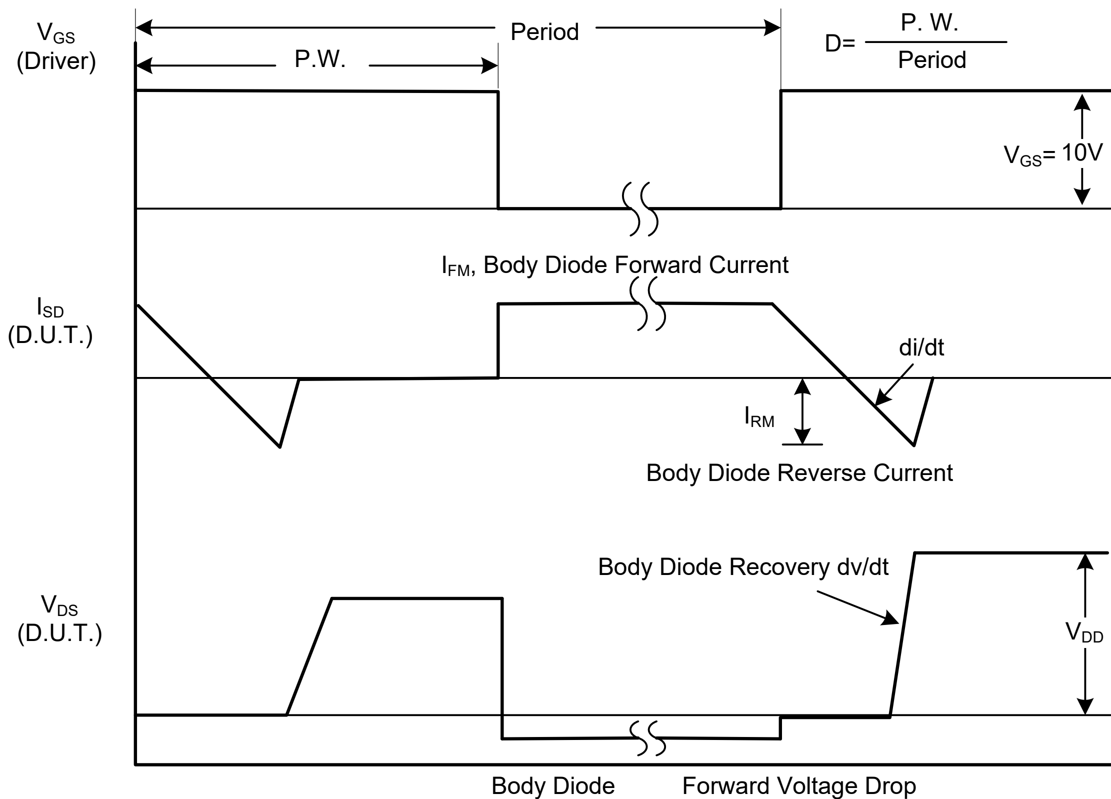
Notes:

1. Pulse test ; Pulse width≤300us, duty cycle≤2%.
2. Essentially independent of operating temperature.

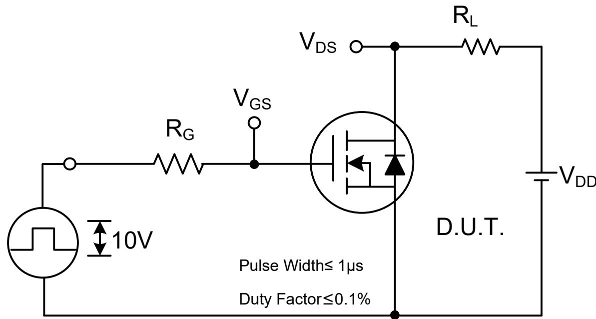
■ TEST CIRCUITS AND WAVEFORMS



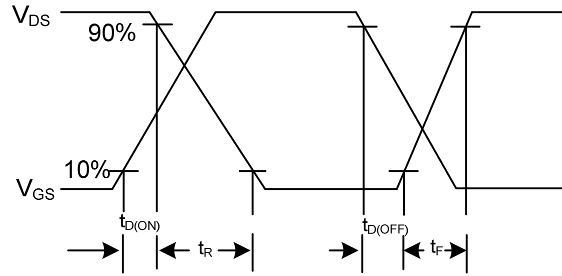
Peak Diode Recovery dv/dt Test Circuit



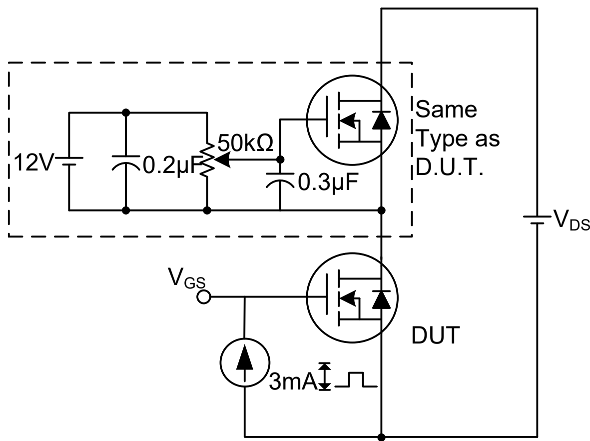
Peak Diode Recovery dv/dt Waveforms



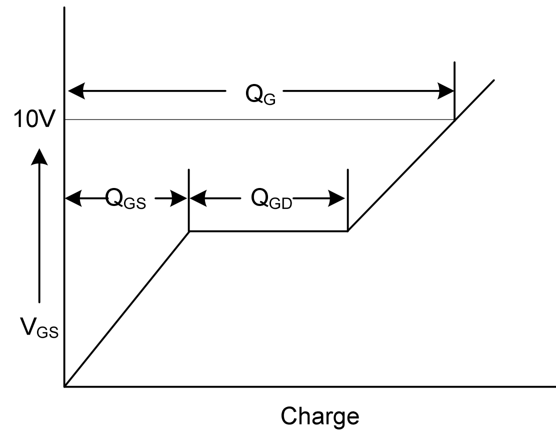
Switching Test Circuit



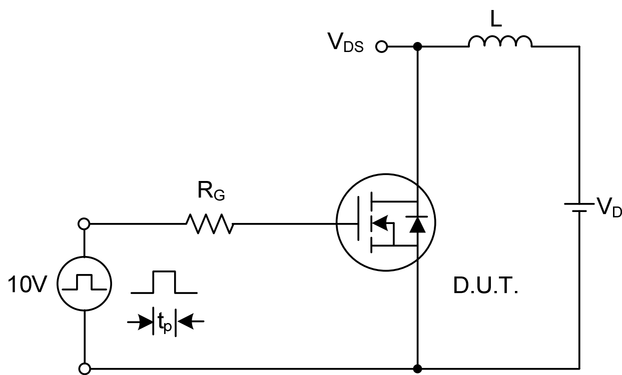
Switching Waveforms



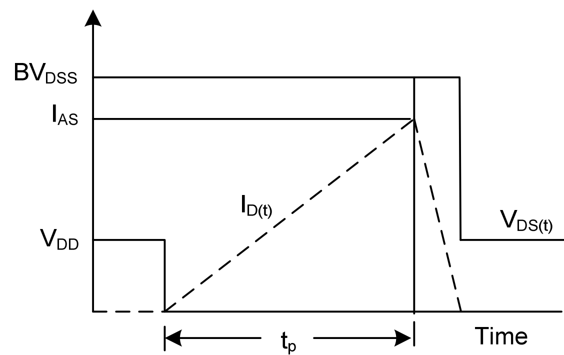
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

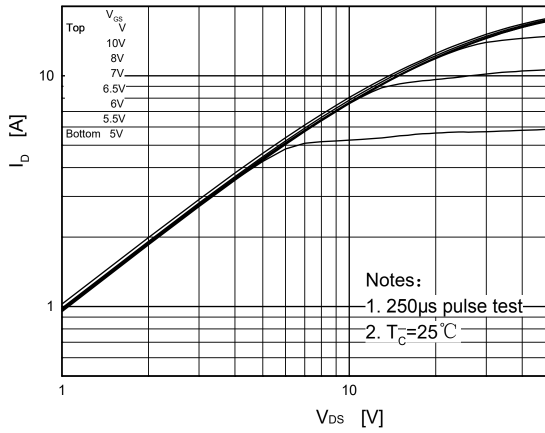


Unclamped Inductive Switching Waveforms

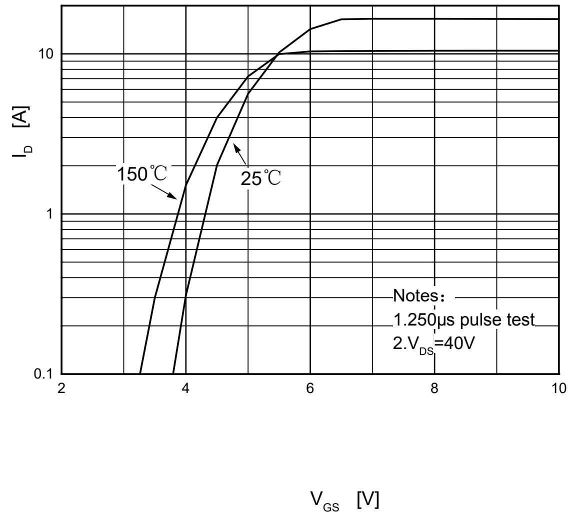
The curve above is for reference only.

■ ELECTRICAL CHARACTERISTICS

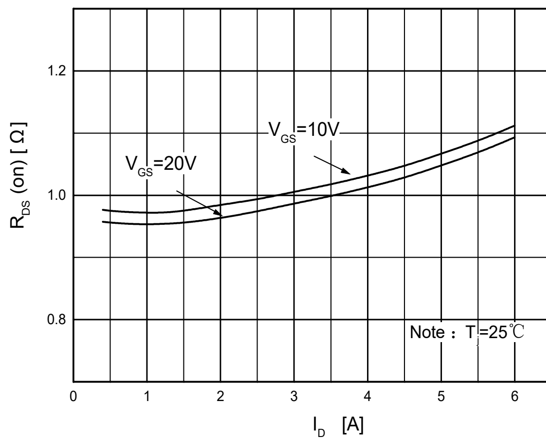
On-Region Characteristics



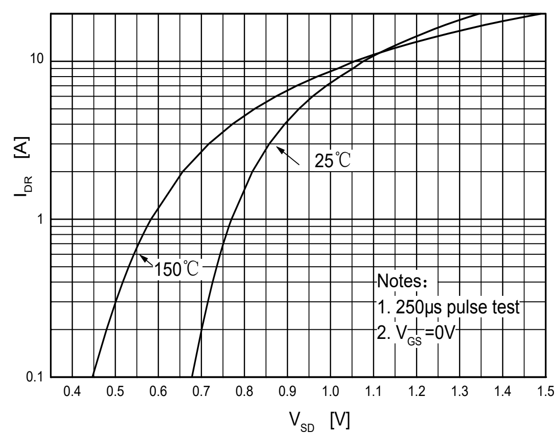
Transfer Characteristics



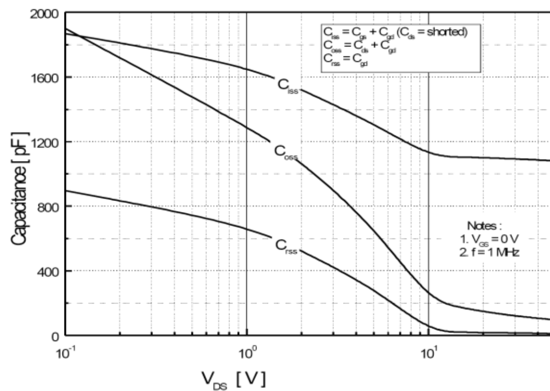
On-Resistance Variation vs. Drain Current and Gate Voltage



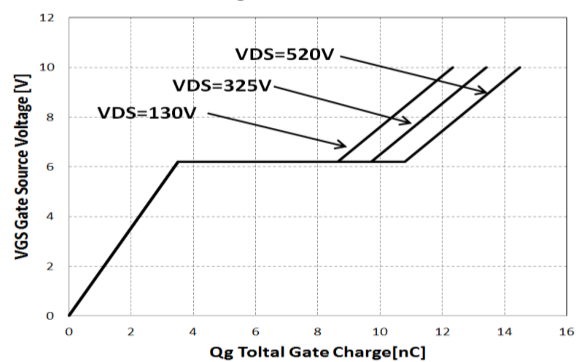
Body Diode Forward Voltage Variation vs. Source Current and Temperature

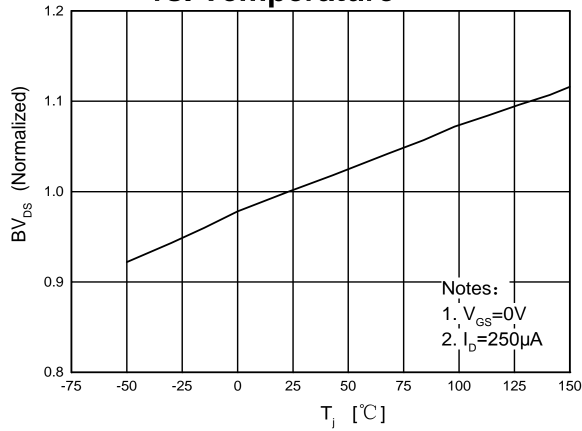


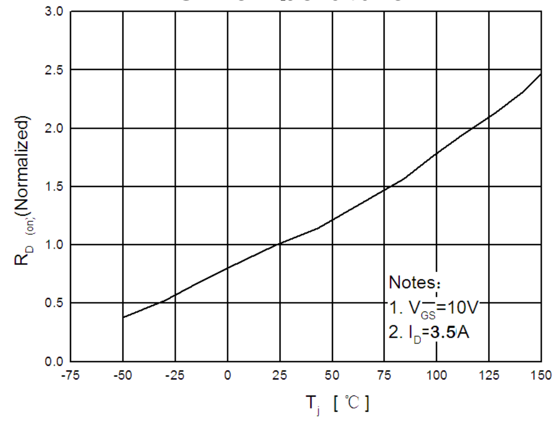
Capacitance Characteristics



Gate Charge Characteristics



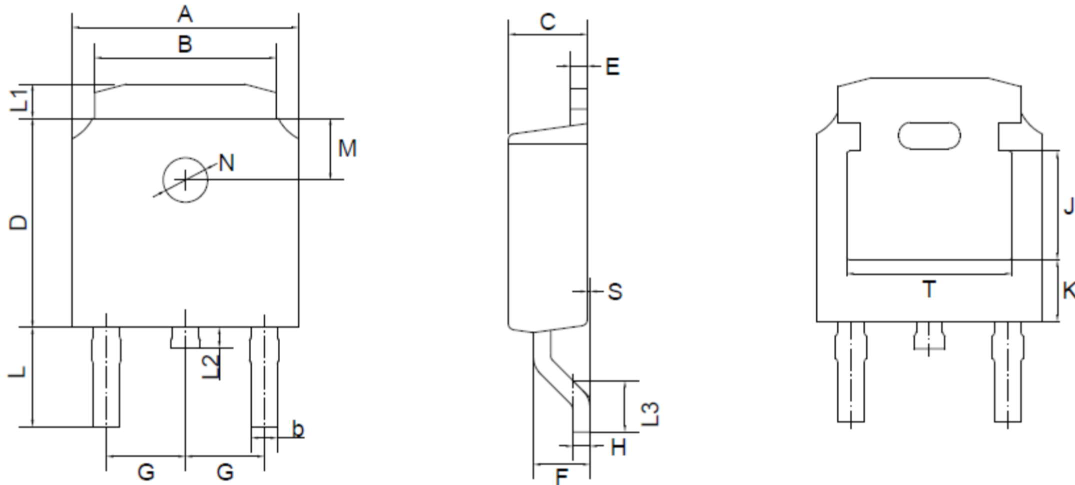




The curve above is for reference only.

Outlitne Drawing

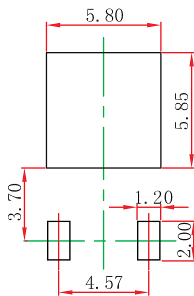
TO-252 Package Outline Dimensions



TO-252(D-PAK) mechanical data

UNIT		A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	K	T
mm	max	6.7	5.5	0.8	2.5	6.3	0.6	1.8	2.29 TYPICAL	0.55	3.1	1.2	1.0	1.75	0.1	1.8 TYPICAL	1.3 TYPICAL	3.16 ref.	1.80 ref.	4.83 ref.
	min	6.3	5.1	0.3	2.1	5.9	0.4	1.3		0.45	2.7	0.8	0.6	1.40	0.0					
mil	max	264	217	31	98	248	24	71	90 TYPICAL	22	122	47	39	69	4	71 TYPICAL	51 TYPICAL	124 ref.	71 ref.	190 ref.
	min	248	201	12	83	232	16	51		18	106	31	24	55	0					

Suggested Pad Layout



Note:
1.Controlling dimension:in/millimeters.
2.General tolerance: ±0.05mm.
3.The pad layout is for reference purposes only.

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