

1500V N-Channel MOSFET

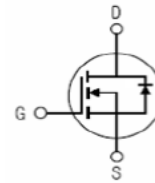
General Description

This Power MOSFET is produced using advanced self-aligned planar technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices can be used in various power switching circuit for system miniaturization and higher efficiency.



Inner Equivalent Principium Chart



Features

- 3A, 1500V, $R_{DS(on)}$ typ. = 5Ω @ $V_{GS} = 10V$ $I_d = 1.5A$
- Low gate charge (typical 9.3nC)
- Low gate charge (typical 2.4pf)
- Fast switching
- 100% avalanche tested

Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

Symbol	Parameter	JFFM3N150C	Units
V_{DSS}	Drain – Source Voltage	1500	V
I_D	Drain Current	Continuous ($T_c = 25^\circ C$)	1.8
		Continuous ($T_c = 100^\circ C$)	1.2
I_{DM}	Drain Current - Pulsed (Note 1)	12	A
V_{GSS}	Gate – Source Voltage	± 30	V
EAS	Single Pulsed Avalanche Energy (Note 2)	225	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5	V/ns
P_D	Power Dissipation ($T_c = 25^\circ C$)	30	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes 1/8" from case for 5 seconds	300	$^\circ C$

*Drain current limited by maximum junction temperature.

Thermal characteristics

Symbol	Parameter	JFFM3N150C	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.1	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ C/W$

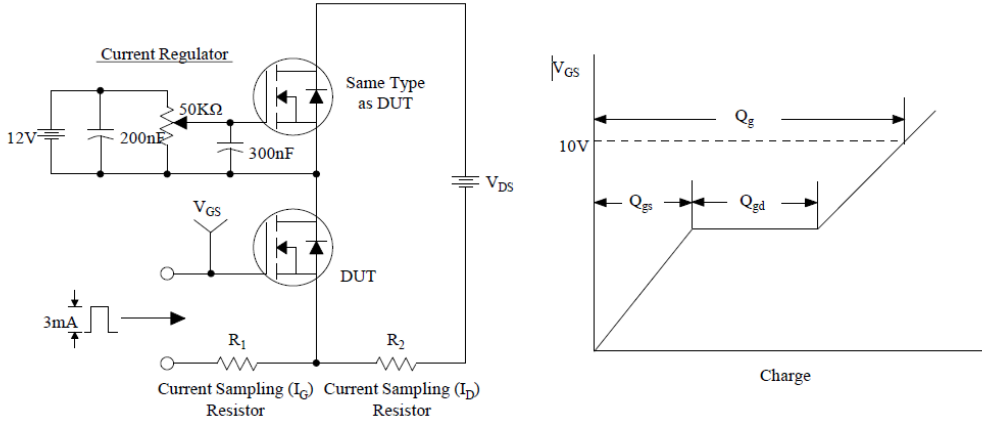
Electrical Characteristics $T_c = 25\text{ }^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain – Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	1500	--	--	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to $25\text{ }^\circ\text{C}$	--	1.3	--	V/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 1500\text{ V}, V_{GS} = 0\text{ V}$	--	--	25	μA
		$V_{DS} = 1200\text{ V}, T_c = 125\text{ }^\circ\text{C}$	--	--	500	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance	$V_{GS} = 10\text{ V}, I_D = 1.5\text{ A}$	--	5	8	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 30\text{ V}, I_D = 1.5\text{ A}$ (Note 4)	--	4.5	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	1938	--	pF
C_{oss}	Output Capacitance		--	104	--	pF
C_{rss}	Reverse Transfer Capacitance		--	2.4	--	pF
R_g	Gate resistance	$F = 1.0\text{ MHz}$	--	3.5	--	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 750\text{ V}, I_D = 3.0\text{ A}, R_G = 10\Omega, V_{GS} = 10\text{ V}$ (Note 4,5)	--	34	--	ns
t_r	Turn-On Rise Time		--	17	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	56	--	ns
t_f	Turn-Off Fall Time		--	27	--	ns
Q_g	Total Gate Charge	$V_{DS} = 750\text{ V}, I_D = 3.0\text{ A}, V_{GS} = 10\text{ V}$ (Note 4,5)	--	9.3	--	nC
Q_{gs}	Gate-Source Charge		--	15	--	nC
Q_{gd}	Gate-Drain Charge		--	5.3	--	nC
Drain – Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	3	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	12	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 3.0\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 3.0\text{ A}$	--	302	--	ns
Q_{rr}	Reverse Recovery Charge	$di_f/dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	10	--	μC

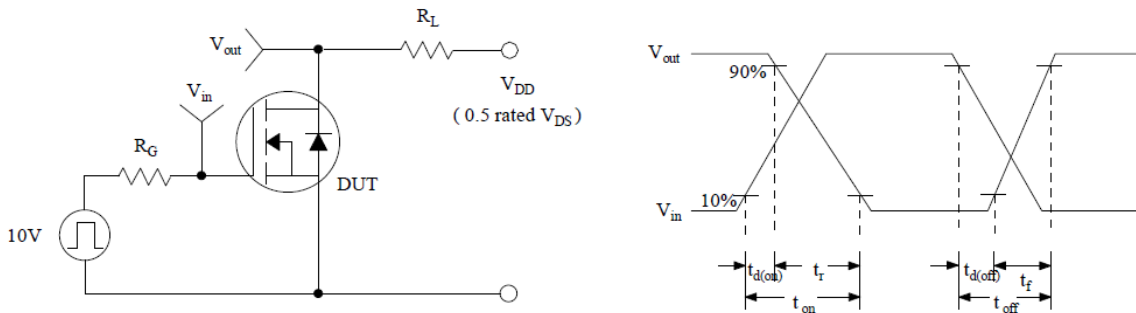
Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature
2. $L = 10.0\text{ mH}, I_{AS} = 6.7\text{ A}, R_G = 25\Omega$, Starting $T_j = 25\text{ }^\circ\text{C}$
3. $I_{SD} \leq 3.0\text{ A}, di/dt \leq 100\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_j = 25\text{ }^\circ\text{C}$
4. Pulsed Test : Pulsed width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

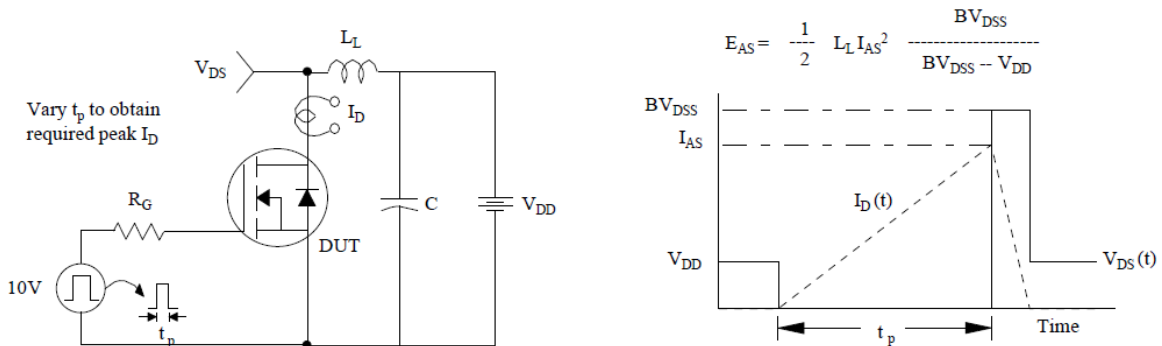
Test Circuit & Waveform



Gate Charge Test Circuit & Waveform

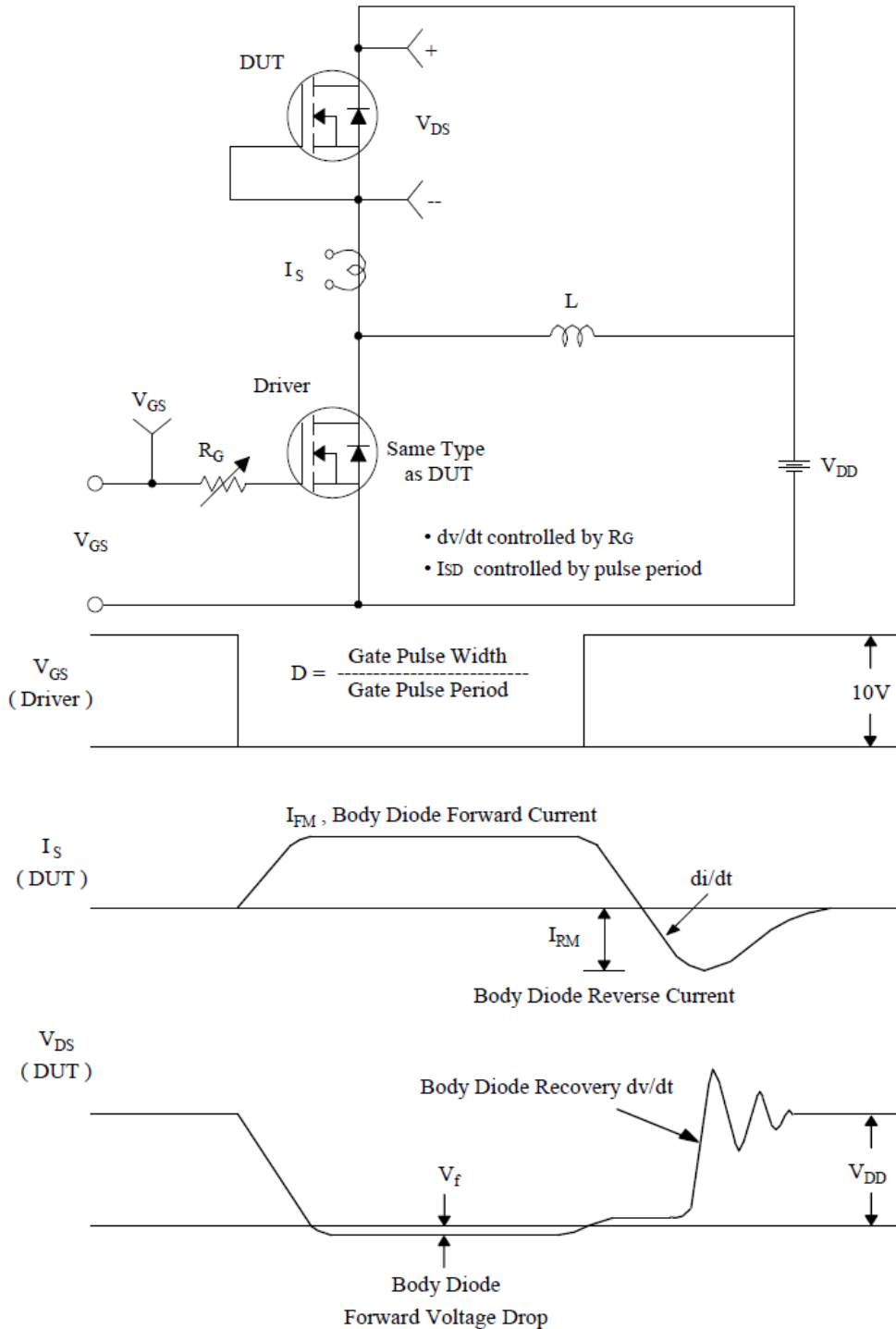


Resistive Switching Test Circuit & Waveforms



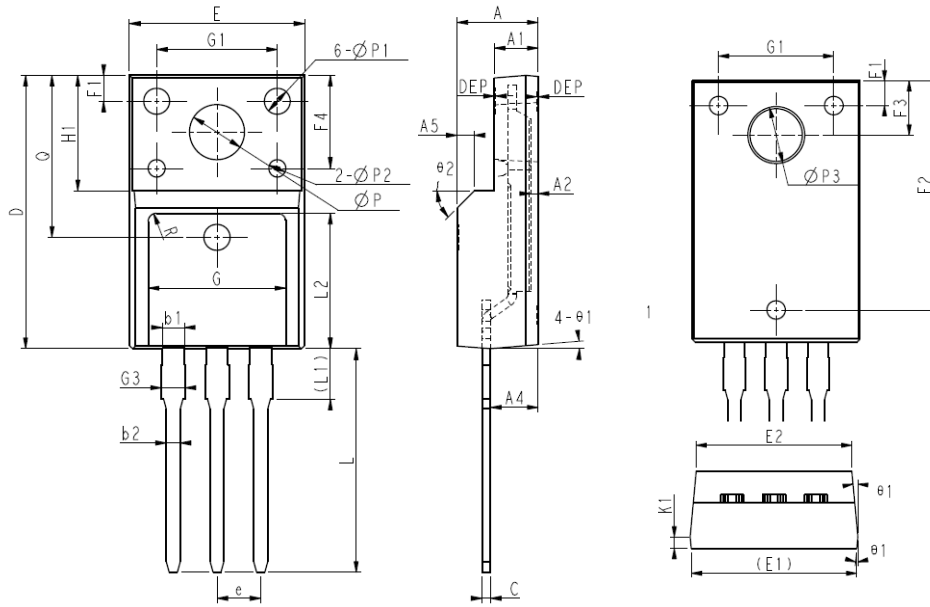
Unclamped Inductive Switching Test Circuit & Waveforms

Test Circuit & Waveform



Peak Diode Recovery dv/dt Test Circuit & Waveforms

封装外型



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.16	10.32
F1	9.34	10.01	10.14
F2	9.36	9.46	9.56
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.43	-	0.48
A4	2.66	2.76	2.86
A5	1.00REF		
e	0.45	0.50	0.60
D	15.67	15.87	16.07
Q	9.40REF		
H1	6.70REF		
e	2.54BSC		
∅P	3.18REF		
L	12.73	12.93	13.13
L1	2.32	2.32	2.03
L2	7.70	7.80	7.90
∅P1	1.40	1.50	1.60
∅P2	0.95	1.00	1.05
∅P3	3.45REF		
∅1	3"	5"	7"
∅2	-	45"	-
DEP	0.05	0.10	0.15
F1	1.00	1.50	2.00
F2	13.80	13.90	14.00
F3	3.20	3.30	3.40
F4	5.30	5.40	5.50
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
G2	1.25	1.35	1.45
b1	1.23	1.28	1.38
b2	0.75	0.80	0.90
K1	0.65	0.70	0.75
R	0.50REF		