



I2MNAB13H



650V N-Channel MOSFETs

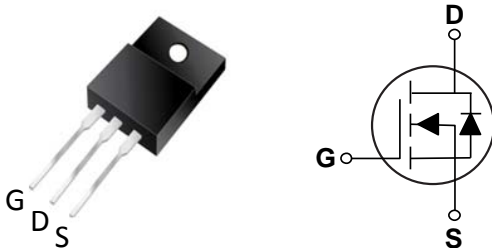
General Description

The I2MNAB13H is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristic.

This power MOSFET is usually used in high speed switching applications of switching power supplies and adaptors.

BV_{DSS}	R_{DS(ON)}	I_D
650 V	1.3 Ω	7 A

TO-220F Pin Configuration



Features

- $R_{DS(ON)} \leq 1.3 \Omega @ V_{GS}=10V$
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	±30	V
I_D	Drain Current - Continuous	7	A
I_{DM}	Drain Current - Pulsed (NOTE 2)	14	A
E_{AS}	Single Pulse Avalanche Energy (NOTE 3)	281.3	mJ
P_D	Power Dissipation	35	W
T_J	Operating Junction Temperature Range	-50 to 150	°C
T_{STG}	Storage Temperature Range	-50 to 150	°C
Marking Code		NAB13H	

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. $L=10mH$, $I_{AS}=7.5A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J= 25^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	3.57	°C/W

**Electrical Characteristics (T_J=25°C, unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	650	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =650V, V _{GS} =0V	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±30V, V _{DS} =0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =3.5A	---	---	1.3	Ω
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	2.0	---	4.0	V

Dynamic and switching Characteristics (NOTE3)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q _g	Total Gate Charge	V _{DS} =520V, V _{GS} =10V, I _D =7A, I _G =1mA (NOTE 4 · 5)	---	22	---	nC
Q _{gs}	Gate-Source Charge		---	5	---	
Q _{gd}	Gate-Drain Charge		---	5.5	---	
T _{d(on)}	Turn-On Delay Time	V _{DS} =100V, V _{GS} =10V, R _G =25Ω, I _D =7A (NOTE 4 · 5)	---	12	---	nS
T _r	Rise Time		---	20	---	
T _{d(off)}	Turn-Off Delay Time		---	74	---	
T _f	Fall Time		---	33	---	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	870	---	pF
C _{oss}	Output Capacitance		---	97	---	
C _{rss}	Reverse Transfer Capacitance		---	9.6	---	

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Maximum Body-Diode Continuous Current		---	---	7	A
I _{SM}	Maximum Body-Diode Pulsed Current		---	---	14	A
V _{SD}	Diode Forward Voltage (NOTE 4)	V _{GS} =0V, I _S =7A	---	---	1.4	V
t _{rr}	Reverse Recovery Time	I _S =7A, V _{GS} =0V, di/dt=100A/μs	---	506	---	nS
Q _{rr}	Reverse Recovery Charge		---	2.7	---	uC

NOTES :

4. Pulse test : pulse width ≤ 300us, duty cycle ≤ 2%.
5. Essentially independent of operating temperature.



Test Circuits And Waveforms

FIG. 1-Peak Diode Recovery dv/dt Test Circuit

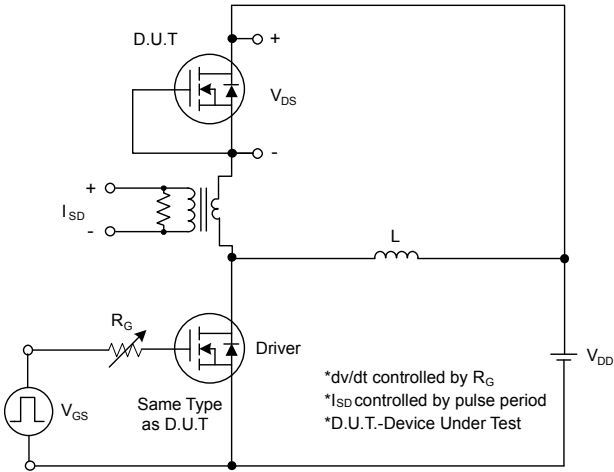


FIG. 2-Peak Diode Recovery dv/dt Waveforms

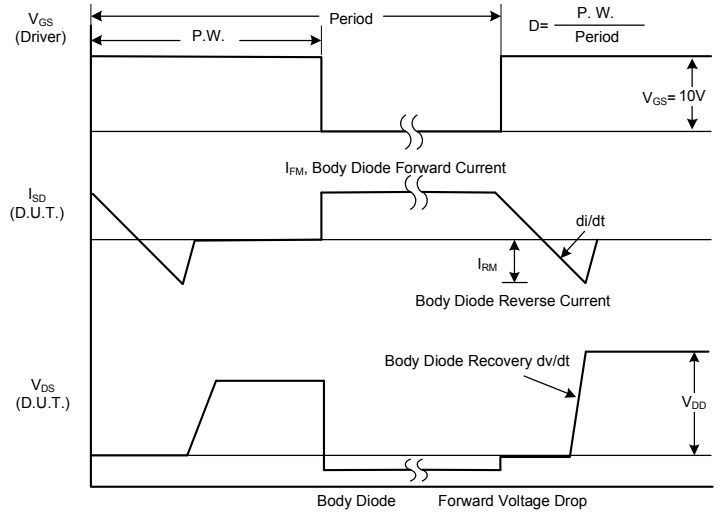


FIG. 3-Switching Test Circuit

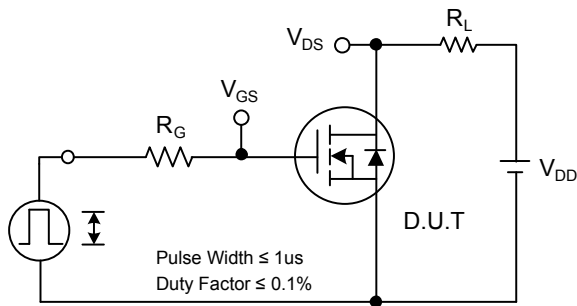


FIG. 4-Switching Waveforms

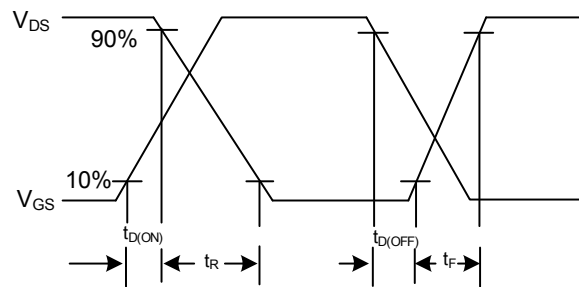


FIG. 5-Gate Charge Test Circuit

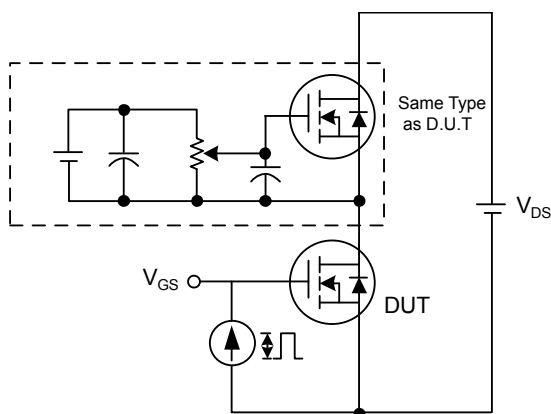
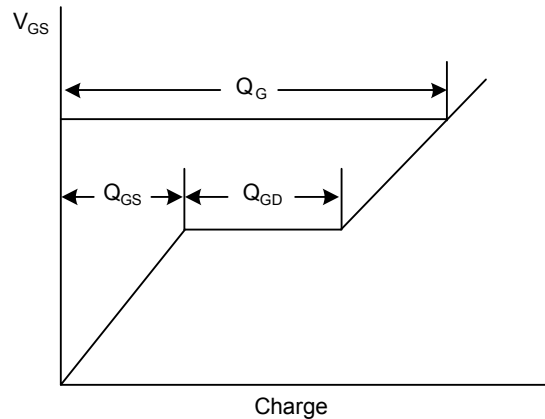


FIG. 6-Gate Charge Waveform





Test Circuits And Waveforms

FIG. 7-Unclamped Inductive Switching Test Circuit

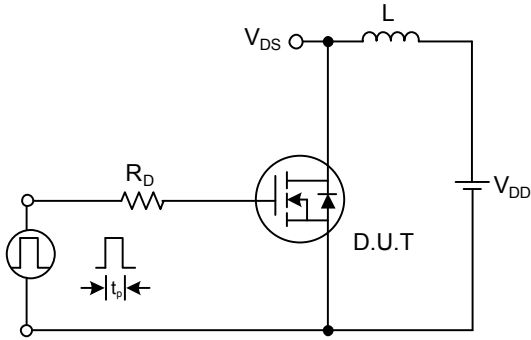
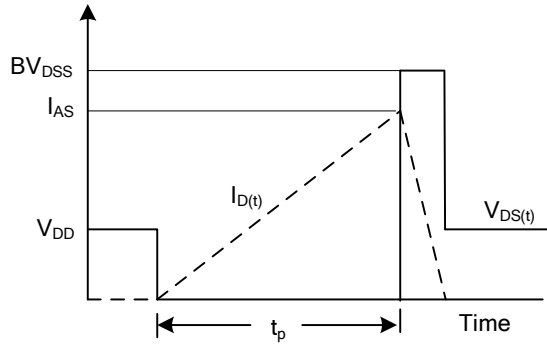
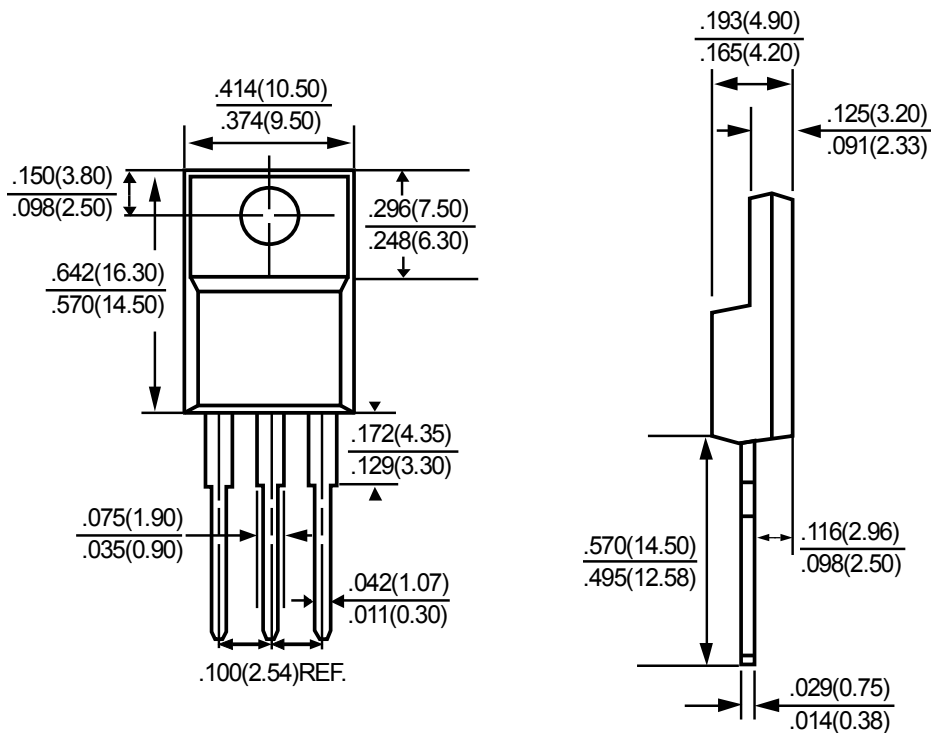


FIG. 8-Unclamped Inductive Switching Waveforms



Package Outline Dimensions



TO-220F

Dimensions in inches and (millimeters)



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