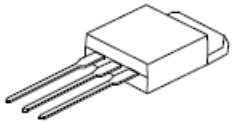
500V/11A Power MOSFET (N-Channel)

General Description

- MSU11N50Q is a N-Channel enhancement mode power MOSFET with advanced technology. It is designed to have Better characteristics, such as fast switching time, low gate charge, minimized on-state resistance and withstanding high energy pulse in the avalanche and commutation modes. These devices are well suited for high efficiency switching mode power supply applications.



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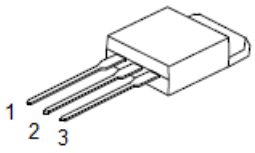
RoHS Compliant

HALOGEN FREE

Features

- $R_{DS(ON)}$ =0.55Ω@V_{GS}=10V
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness
- RoHS Compliance and Halogen free

Pin Configuration and Symbol



1: GATE 2: DRAIN 3: SOURCE

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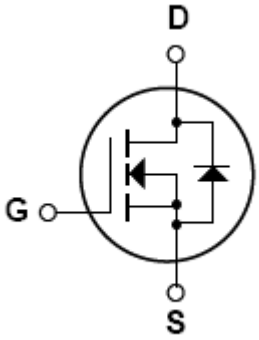

Absolute Maximum Ratings *(T_C=25ºC unless otherwise specified, Note)*

Symbol	Description		Ratings	Unit
V_{DSS}	Drain-Source Voltage		500	V
V_{GSS}	Gate-Source Voltage		± 30	V
I_D	Drain Current -Continuous	Tc=25°C (Note1)	11	A
		Tc=100°C (Note1)	7	A
I_{DM}	Drain Current -Pulsed (note2)		44	A
E_{AS}	Single Pulsed Avalanche Energy (Note 3)		670	mJ
dv/dt	Peak Diode Recovery dv/dt (Note4)		4.5	V/ns
P_D	Power Dissipation	Tc=25°C	195	W
		Derate above 25°C	1.56	W/°C
$R_{\theta JA}$	Thermal Resistance (Junction-to-Ambient)		62.5	°C/W
$R_{\theta JC}$	Thermal Resistance (Junction-to-Case)		0.64	°C/W
T_J	Junction Temperature		+150	°C
T_{STG}	Storage Temperature Range		-55 to +150	°C

Note: Absolute maximum ratings indicate limits beyond which damage to the device may occur.
For guarantee specification and test conditions, see the Electrical Characteristics.
The guaranteed specification apply only for the test conditions listed.

Note1: Drain current limited by maximum junction temperature
2: Repetitive Rating: Pulse width limited by maximum junction temperature
3: L=10mH, I_{AS}=11A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
4: Isd≤11A, di/dt≤200A/μs, V_{DD}≤$V_{BR(DSS)}$, Starting T_J=25°C

Electrical Characteristics *(T_C=25ºC unless otherwise specified)*

Symbol	Description		Min.	Typ.	Max.	Unit	Conditions
OFF CHARACTERISTICS							
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		500	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient		-	0.5	-	V/°C	I_D=250μA
I_{DSS}	Drain-Source leakage Current		-	-	10	μA	V_{DS}=500V, V_{GS}=0V
			-	-	100	μA	V_{DS}=500V, T_J=125°C
I_{GSS}	Gate-Source leakage Current	Forward	-	-	100	nA	V_{GS}=30V, V_{DS}=0V
		Reverse	-	-	-100	nA	V_{GS}=-30V, V_{DS}=0V
ON CHARACTERISTICS							
$V_{GS(th)}$	Gate-Source Threshold Voltage		2.0	-	4.0	V	V_{DS}=V_{GS}, I_D=250μA
$R_{DS(ON)}$	Static Drain-Source On-State Resistance		-	0.48	0.55	Ω	V_{GS}=10V, I_D=5.5A
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance		-	1515	2055	pF	V_{DS}=25V, V_{GS}=0V, f=1.0MHz
C_{oss}	Output Capacitance		-	185	235	pF	
C_{rss}	Reverse Transfer Capacitance		-	25	30	pF	
SWITCHING CHARACTERISTICS							
$t_{d(on)}$	Turn-on Delay Time		-	24	57	nS	V_{DD} =250V, I_D=11A, R_G=3Ω (Note 5,6)
t_r	Turn-on Rise Time		-	70	150	nS	
$t_{d(off)}$	Turn-off Delay Time		-	120	250	nS	
t_f	Turn-off Fall Time		-	75	160	nS	
Qg	Total Gate Charge		-	43	55	nC	V_{DS} =400V, I_D=11A, V_{GS} =10V (Note 5,6)
Qgs	Gate-Source Charge		-	8	-	nC	
Qgd	Gate-Drain Charge		-	19	-	nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
V_{SD}	Drain-Source Diode Forward Voltage		-	-	1.4	V	V_{GS} =0V, I_S=11A
I_S	Maximum Continuous Drain-Source Diode Forward Current		-	-	11	A	-
I_{SM}	Maximum Pulse Drain-Source Diode Forward Current		-	-	44	A	-
t_{rr}	Reverse Recovery Time		-	90	-	nS	V_{GS} =0V, I_S=11A dI_F/dt=100A/us (Note5)
Q_{rr}	Reverse Recovery Charge		-	1.5	-	uC	

Note 5: Pulse test: Pulse width ≤300us, Duty cycle≤2%
6: Essentially independent of operating temperature

TEST CIRCUIT AND WAVEFORMS

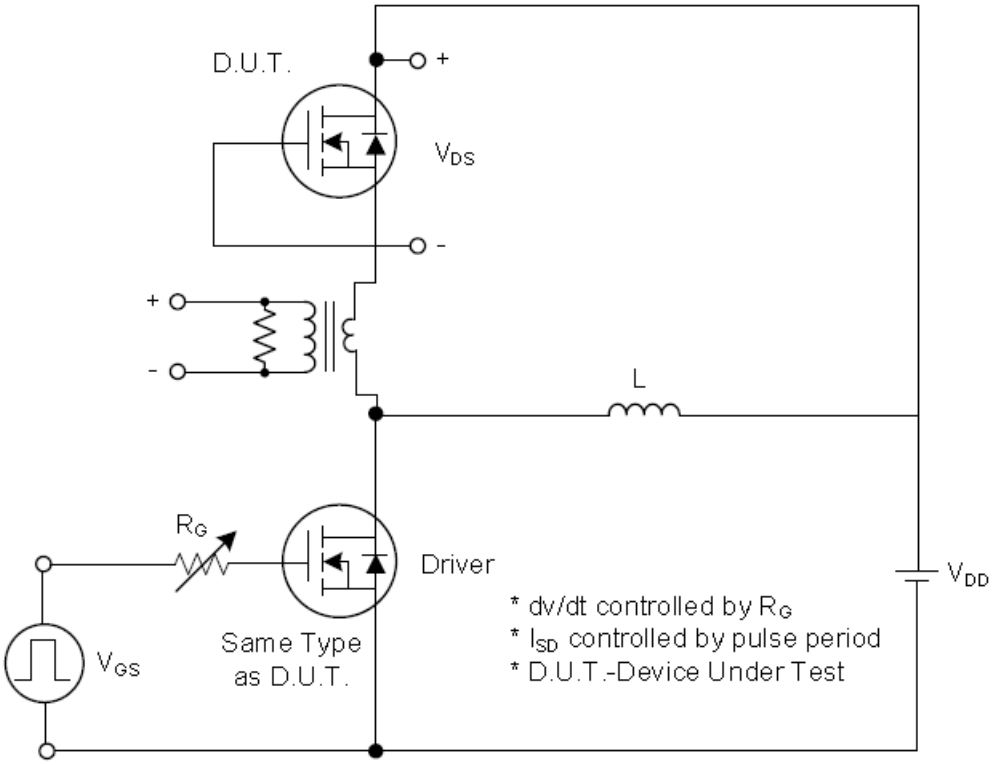

Fig.1- Peak Diode Recovery dv/dt Test Circuit

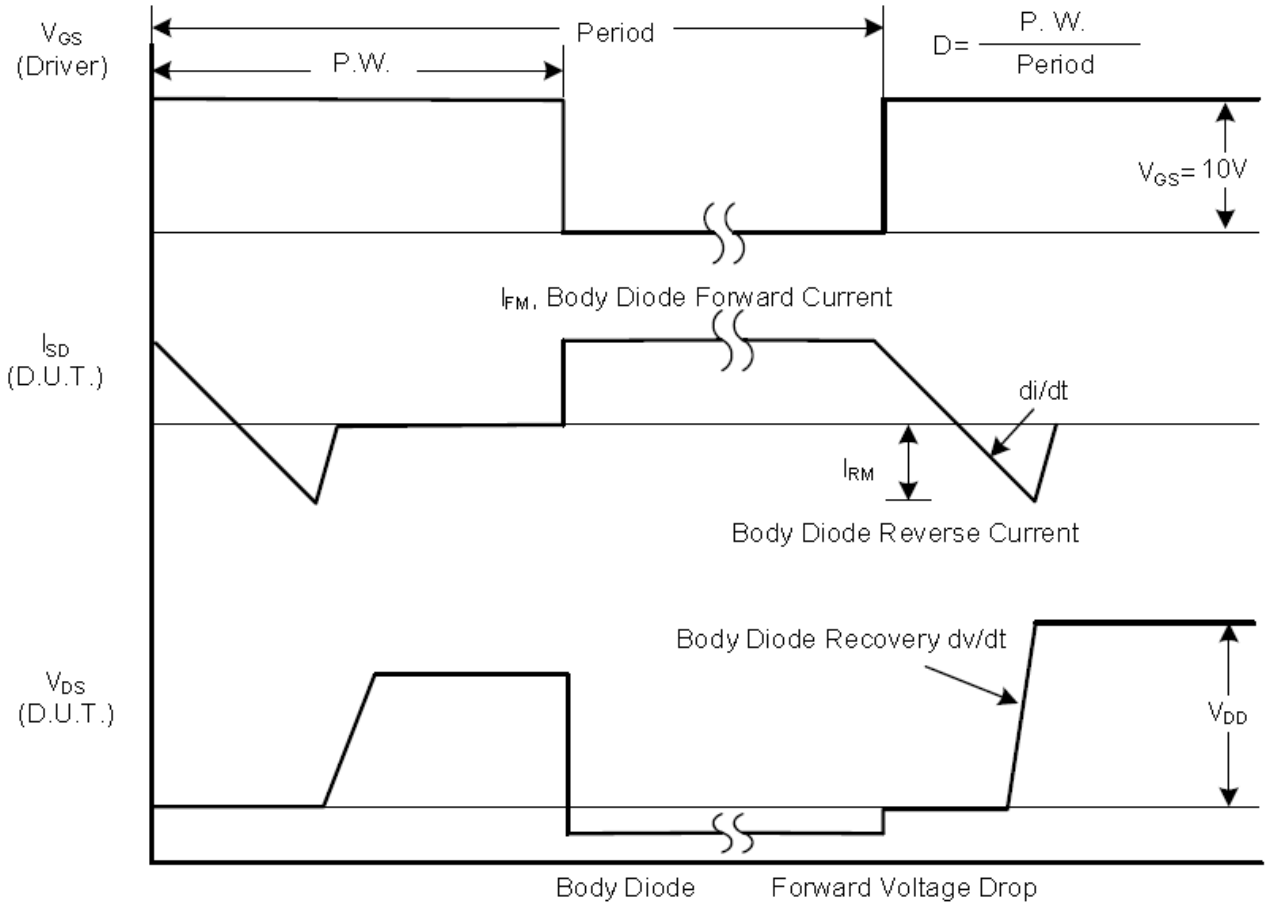

Fig.2- Peak diode Recovery dv/dt Waveform

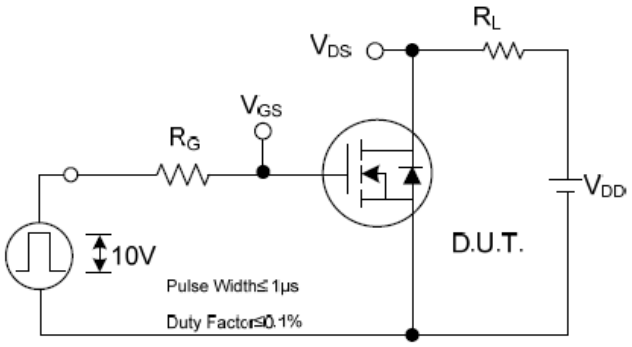

Fig.3- Switching Test Circuit

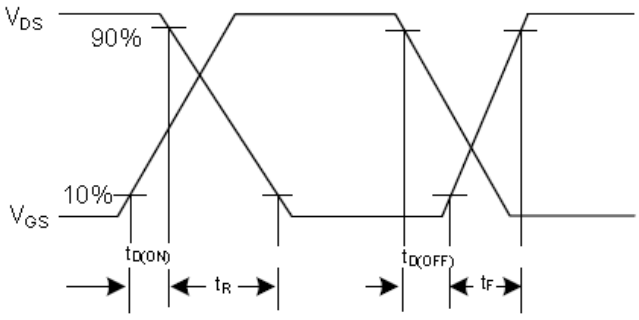

Fig.4- Switching Waveform

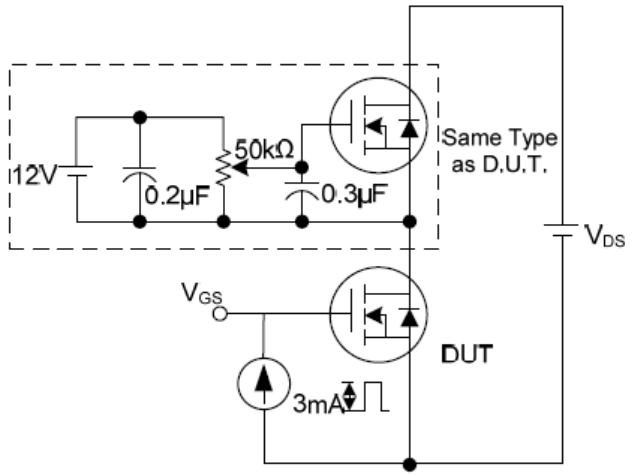

Fig.5- Gate Charge Test Circuit

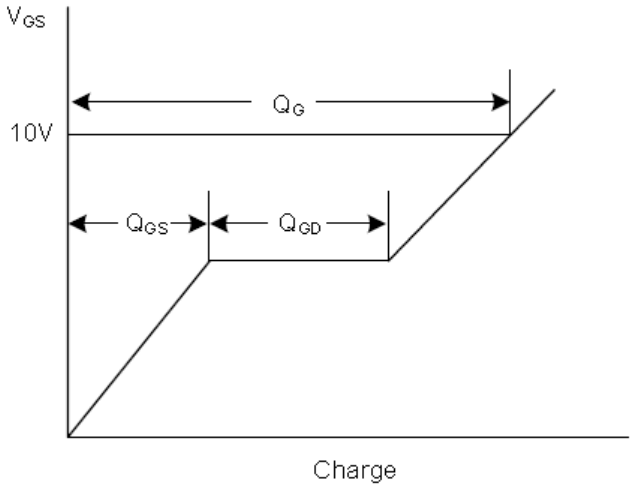

Fig.6- Gate Charge Waveform

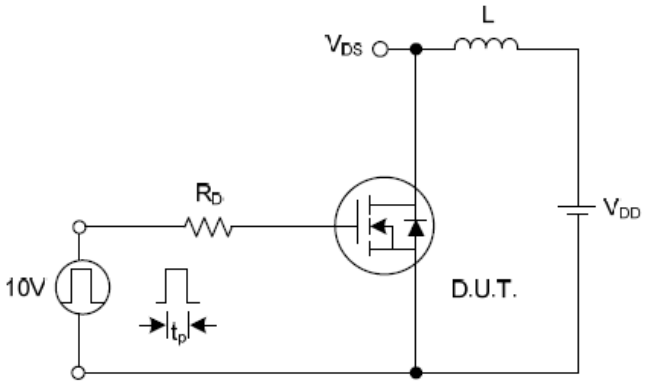

Fig.7- Unclamped Inductive Switching Test Circuit

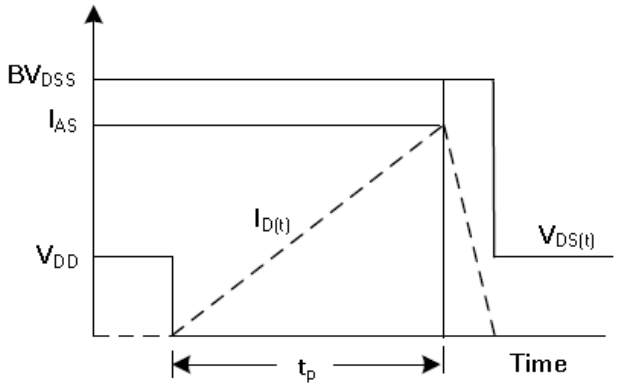

Fig.8 Unclamped Inductive Switching Waveform

Dimensions in mm (inch)

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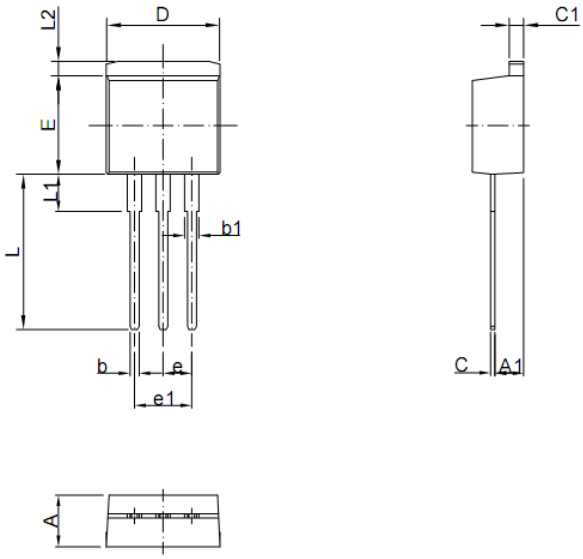
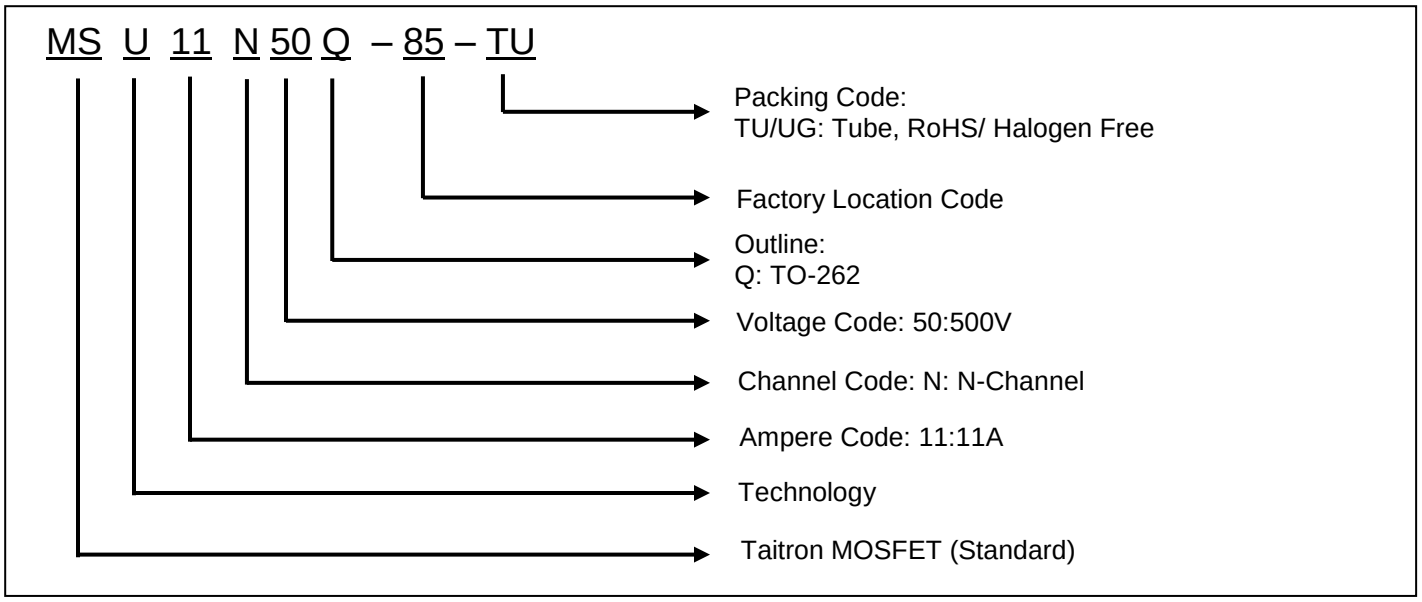


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	4.06	4.83	0.160	0.190
A1	2.040	2.95	0.080	0.116
b	0.50	1.00	0.020	0.039
b1	1.14	1.78	0.045	0.070
C	0.33	0.74	0.013	0.029
C1	1.14	1.65	0.045	0.065
D	9.65	10.67	0.380	0.420
E	8.38	9.65	0.330	0.380
e	2.54 TYP		0.100 TYP	
L	12.90	13.98	0.508	0.550
L1	3.10	3.85	0.122	0.152
L2	1.17	1.68	0.046	0.066

Ordering Information



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