

MSIE40N90-6

Full bridge N Channel 40-V (D-S) MOSFET

Description

The device is using trench DMOS technology. This advanced technology has been especially tailored to minimize $R_{DS(ON)}$, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

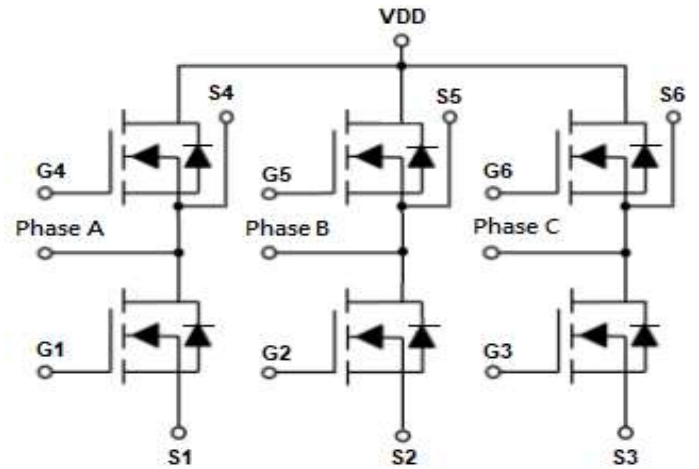
Features

- $R_{DS(ON)} = 7.5m\Omega @ V_{GS} = 10V$
- Fast switching
- Improve dv/dt Capability
- 100% EAS Guaranteed
- Green Device Available

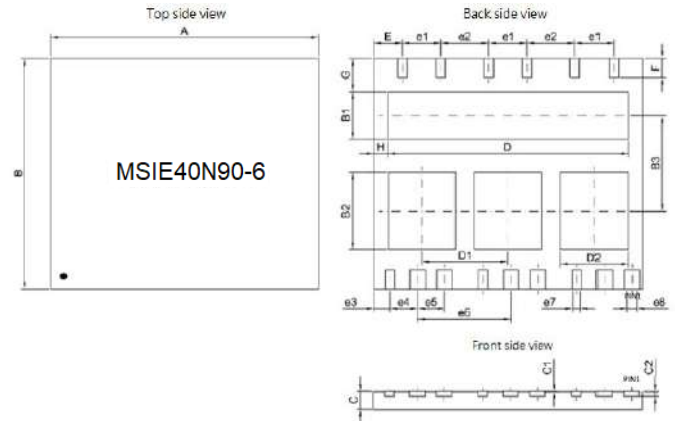
Typical Applications

- 3 phase Motor Driver
- 3 phase Invertor
- Full bridge module

Graphic Symbol

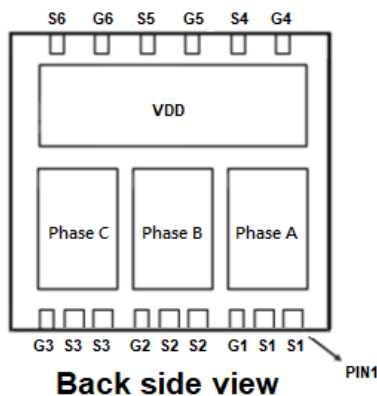


Package Dimension



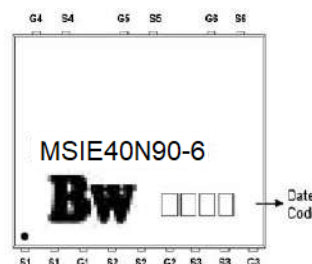
Package type : PDFN 14 x 12

Packing Information



SYMBOL	Dimensions (unit:mm)			SYMBOL	Dimensions (unit:mm)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	13.90	14.00	14.10	e1	2.00 BSC		
B	11.90	12.00	12.10	e2	2.50 BSC		
B1	2.45	2.50	2.55	e3	0.85 BSC		
B2	3.95	4.00	4.05	e4	1.45 BSC		
B3	4.90	4.95	5.00	e5	1.40 BSC		
C	0.90	0.95	1.00	e6	4.87 BSC		
C1	0.00	0.02	0.05	e7	0.45	0.50	0.55
C2	0.254 REF			e8	0.75	0.80	0.85
D	12.45	12.50	12.55	F	0.95	1.00	1.05
D1	4.45	4.50	4.55	G	1.70	1.75	1.80
D2	3.45	3.50	3.55	H	0.70	0.75	0.08
E	1.45	1.50	1.55				

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (T _c =25°C unless otherwise noted)			
Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D	Continuous Drain Current @ T _c =25°C	90	A
	Continuous Drain Current @ T _c =70°C	65	A
I _{DM}	Pulsed Drain Current ²	250	A
I _{AS}	Single Pulse Avalanche Current ³	65	A
E _{AS}	Single Pulse Avalanche Energy ³	211	mJ
P _D	Power Dissipation (T _c =25°C)	85	W
T _J , T _{stg}	Operating Junction and Storage Temperature	-55~+175	°C

Thermal Resistance Ratings			
Symbol	Parameter	Value	Unit
R _{θJA}	Maximum Junction-to-Ambient ¹	60	°C/W
R _{θJC}	Maximum Junction-to-Case	1.4	°C/W

Electrical Characteristics (T _J =25°C unless otherwise specified)						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.9	2.5	V
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	40	-	-	V
I _{GSS}	Gate-Source Leakage Current	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
I _{DSS}	Drain-Source Leakage Current	V _{DS} = 32V, V _{GS} = 0V, T _J = 25°C	-	-	1	μA
		V _{DS} = 32V, V _{GS} = 0V, T _J = 55°C	-	-	5	
R _{DS(on)}	Static Drain-Source On-Resistance ²	V _{GS} = 10V, I _D = 20A	-	5.5	7.5	mΩ
		V _{GS} = 4.5V, I _D = 20A	-	8.5	12	
E _{AS}	Single Pulse Avalanche Energy ⁵	V _{DD} = 25V, L = 0.1mH, I _{AS} = 45A	101	-	-	mJ
V _{SD}	Diode Forward Voltage ²	I _S = 1A, V _{GS} = 0V, T _J = 25°C	-	-	1.2	V
I _S	Continuous Source Current ^{1,6}	V _G = V _D = 0V, Force Current	-	-	80	A
I _{SM}	Pulsed Source Current ^{2,6}		-	-	250	

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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS} = 20V$	--	20	--	nC
Q_{gs}	Gate-Source Charge	$I_D = 15A$	--	4	--	
Q_{gd}	Gate-Drain Charge	$V_{GS} = 10V$	--	4.7	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS} = 20V$	--	11.5	--	ns
t_r	Rise Time	$I_D = 15A$	--	9	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = 10V$	--	24	--	
t_f	Fall Time	$R_G = 3\Omega$	--	15	--	
C_{ISS}	Input Capacitance	$V_{DS} = 20V$	--	1078	--	pF
C_{OSS}	Output Capacitance	$V_{GS} = 0V$	--	483	--	
C_{RSS}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	49	--	
R_g	Gate Resistance	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$		1.9		Ω

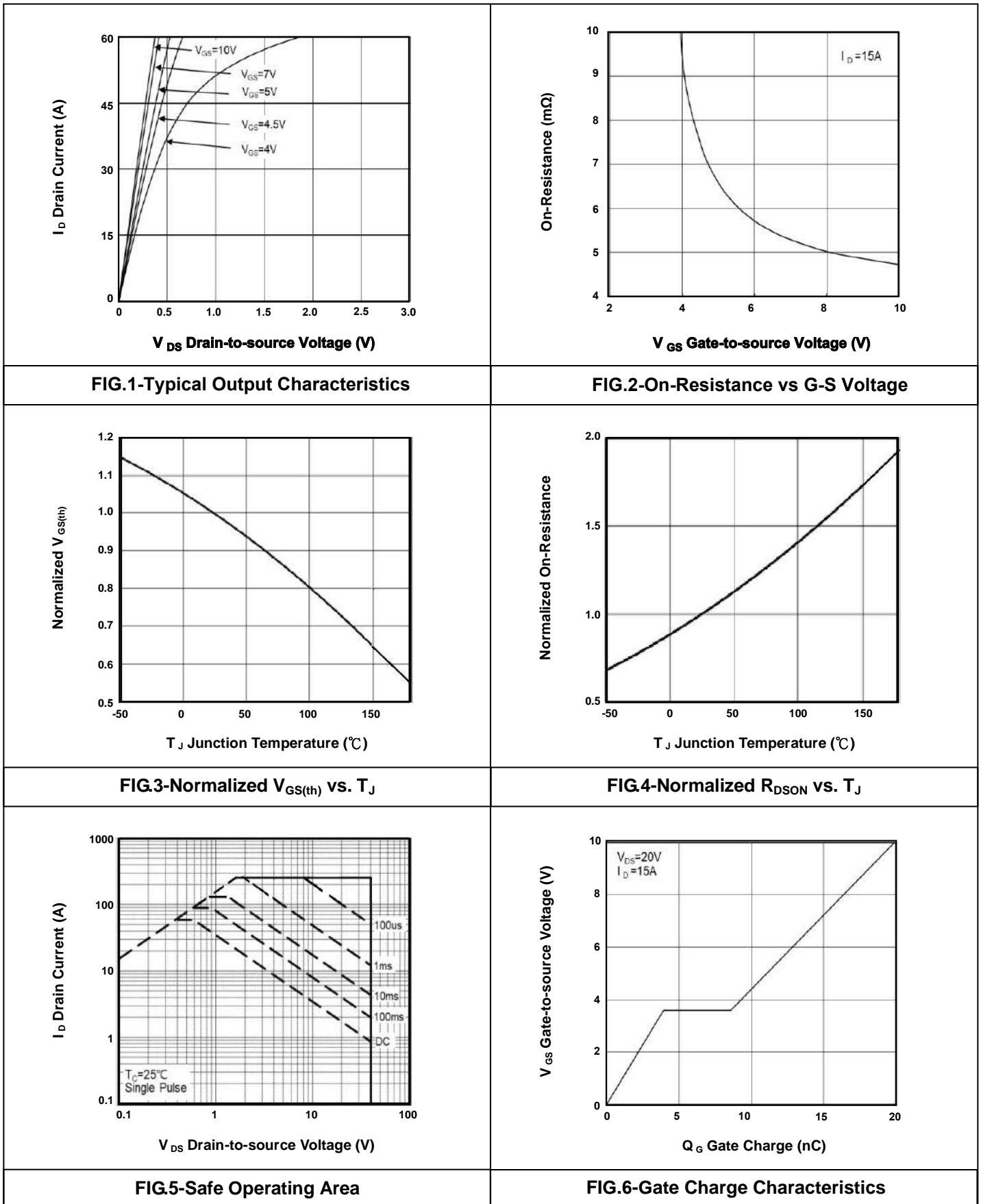
Notes

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. The EAS data shows maximum rating. The test condition is $V_{DD} = 25V, V_{GS} = 10V, L = 0.1 mH, I_{AS} = 65A$.
4. The power dissipation is limited by 175°C junction temperature.
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

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- Typical Electrical Characteristics



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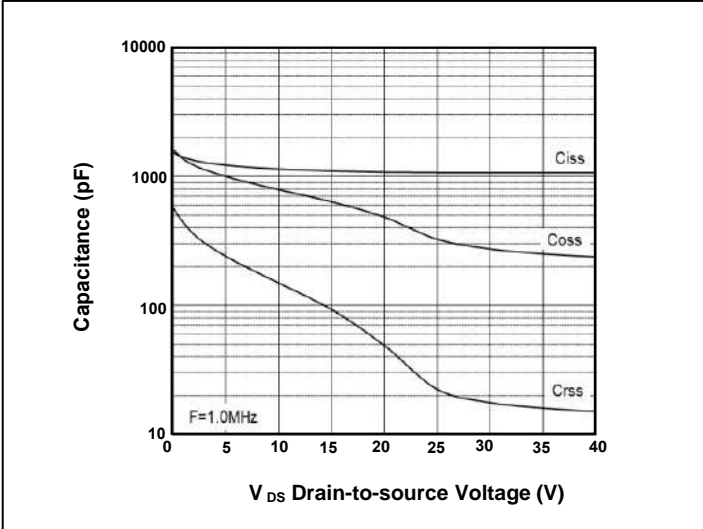


FIG.7- Capacitance

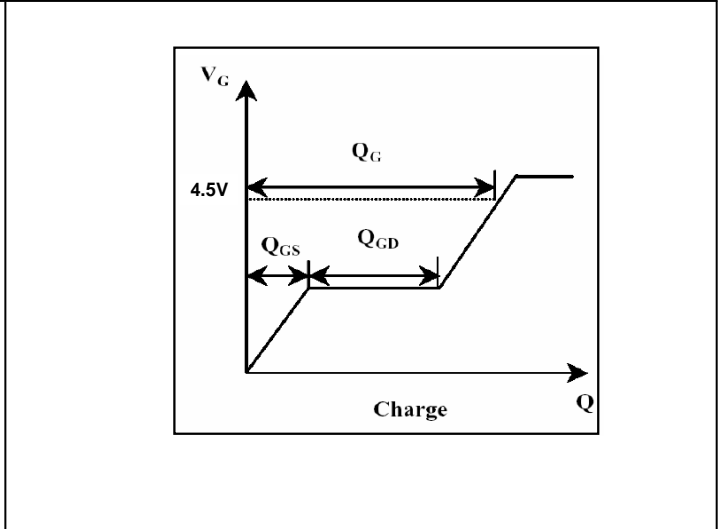


FIG.8-Gate Charge Waveform

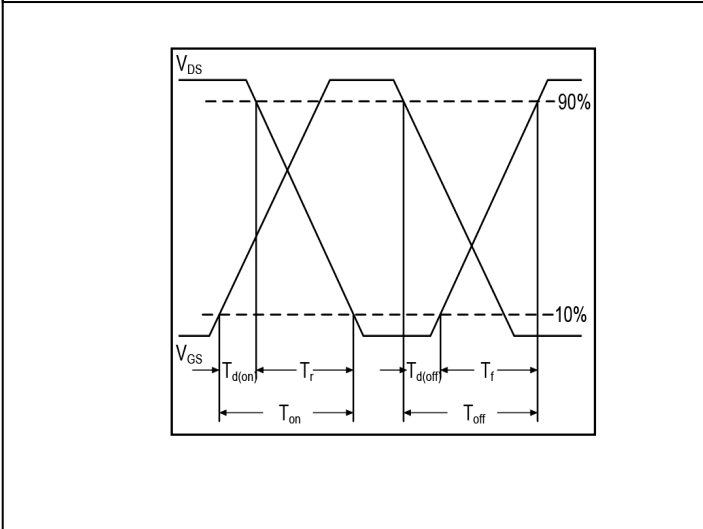


FIG.9-Switching Time Waveform

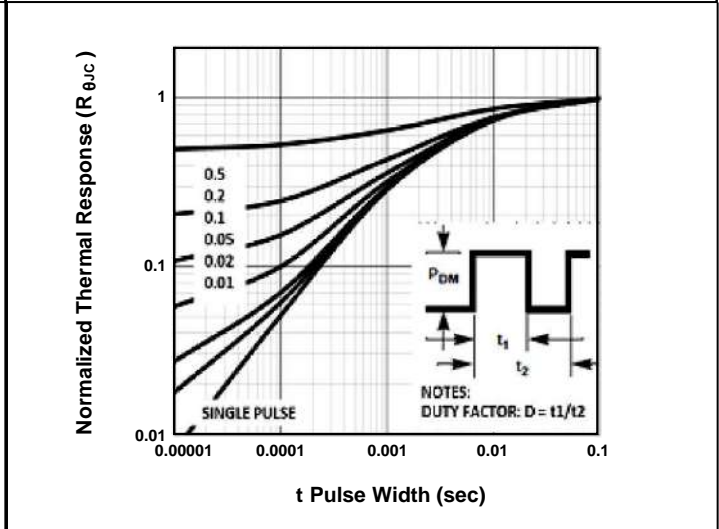


FIG.10-Transient Thermal Impedance

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