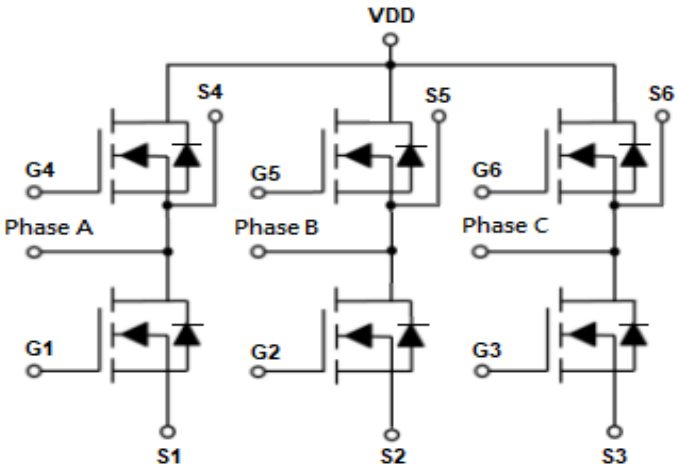
MSIE40N150-6

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.

Graphic Symbol



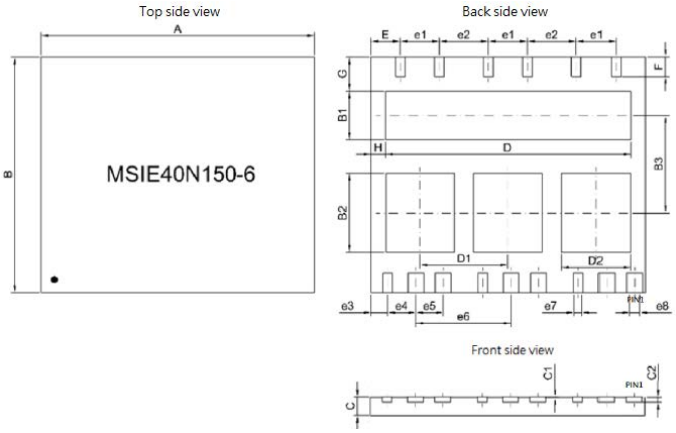
Features

- $R_{DS(ON)}$ =2.6mΩ @ 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

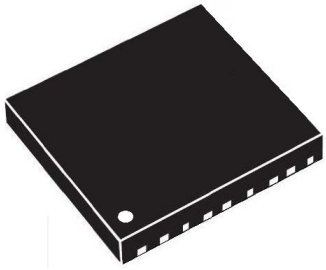
Package Dimension

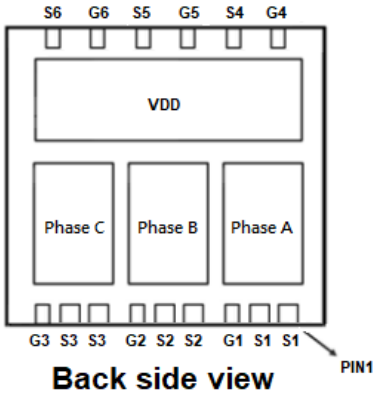


SYMBOL	Dimensions (unit:mm)			SYMBOL	Dimensions (unit:mm)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	13.90	14.00	14.10	e1		2.00 BSC	
B	11.90	12.00	12.10	e2		2.50 BSC	
B1	2.45	2.50	2.55	e3		0.85 BSC	
B2	3.95	4.00	4.05	e4		1.45 BSC	
B3	4.90	4.95	5.00	e5		1.40 BSC	
C	0.90	0.95	1.00	e6		4.87 BSC	
C1	0.00	0.02	0.05	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				

Package type：PDFN 14 x 12

Packing Information



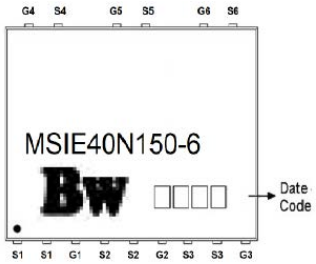


Back side view

AEC-Q101 Qualification Available

RoHS Compliant

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=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	150	A
	Continuous Drain Current @ T_C=70°C	125	A
I_{DM}	Pulsed Drain Current[2]	600	A
I_{AS}	Single Pulse Avalanche Current[3]	90	A
E_{AS}	Single Pulse Avalanche Energy[3]	405	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**
$R_{\theta JA}$	Maximum Junction-to-Ambient[1]	60	°C/W
$R_{\theta JC}$	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	-	2.2	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	-	2.2	2.6	mΩ
		V_{GS} =4.5V, I_D =20A	-	2.8	3.6	
EAS	Single Pulse Avalanche Energy[5]	V_{DD} =25V, L =0.1mH, I_{AS} =60A	180	-	-	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	-	-	150	A
I_{SM}	Pulsed Source Current[2,6]		-	-	450	

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Dynamic						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Q_g	Total Gate Charge[2]	V_{DS} =15V	--	45	--	nC
Q_{gs}	Gate-Source Charge	I_D =20A	--	12	--	
Q_{gd}	Gate-Drain Charge	V_{GS} =10V	--	18.5	--	
$t_{d(on)}$	Turn-On Delay Time[2]	V_{DS} =15V	--	18.5	--	ns
t_r	Rise Time	I_D =20A	--	9	--	
$t_{d(off)}$	Turn-Off Delay Time	V_{GS} =10V	--	58.5	--	
t_f	Fall Time	R_G =3.3Ω	--	32	--	
C_{ISS}	Input Capacitance	V_{DS} =20V	--	3972	--	pF
C_{OSS}	Output Capacitance	V_{GS} =0V	--	1119	--	
C_{RSS}	Reverse Transfer Capacitance	f =1.0MHz	--	82	--	
Rg	Gate Resistance	V_{DS} =0V, V_{GS} =0V, f =1.0MHz		1.0		Ω

Notes

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows maximum rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1 mH, I_{AS}=90A.
4. The power dissipation is limited by 175℃ 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**

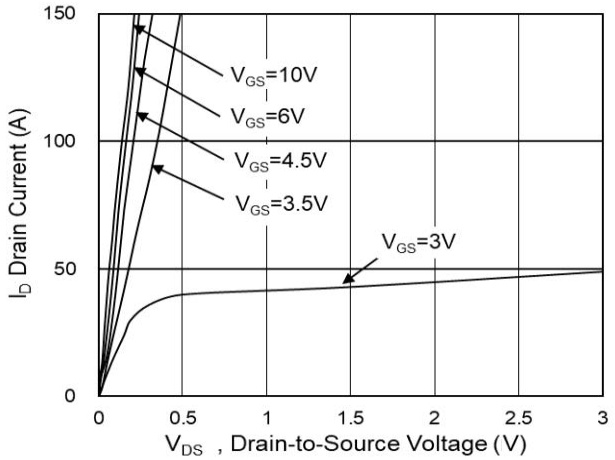

FIG.1-Typical Output Characteristics

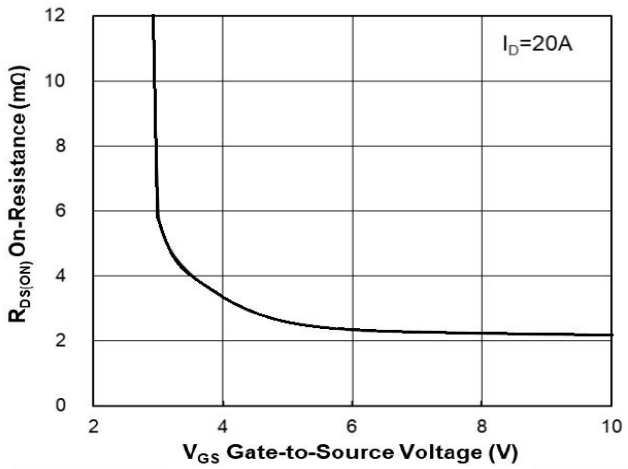

FIG.2-On-Resistance vs. G-S Voltage

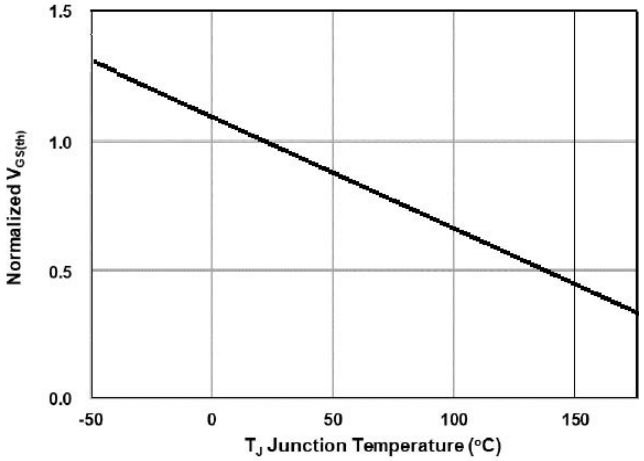

FIG.3-Normalized $V_{GS(th)}$ vs. T_J

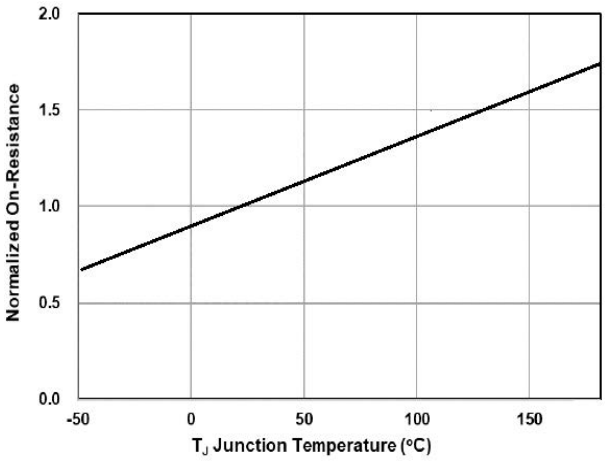

FIG.4-Normalized R_{DSON} vs. T_J

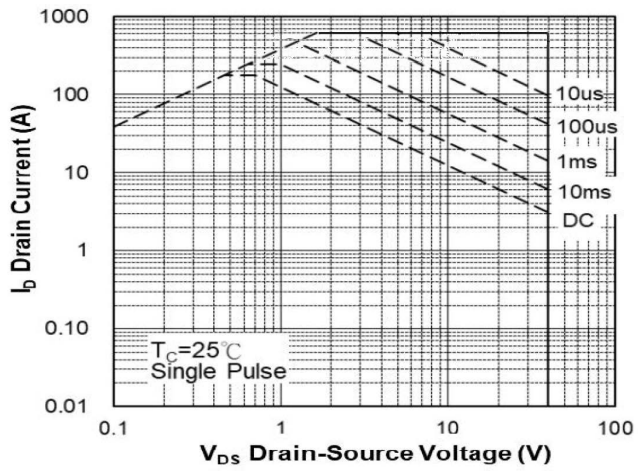

FIG.5-Safe Operating Area

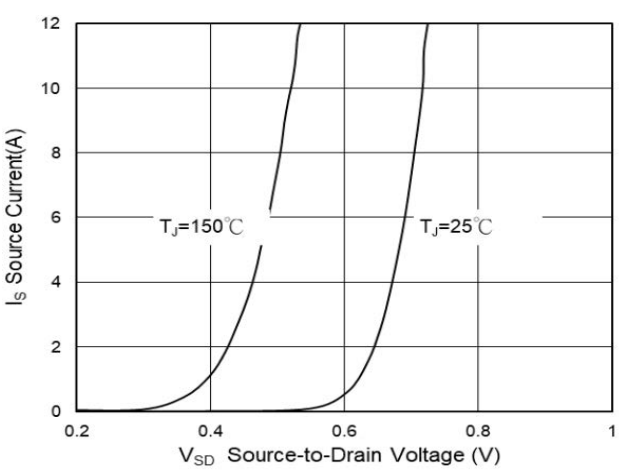

FIG.6-Source Drain Forward Characteristics

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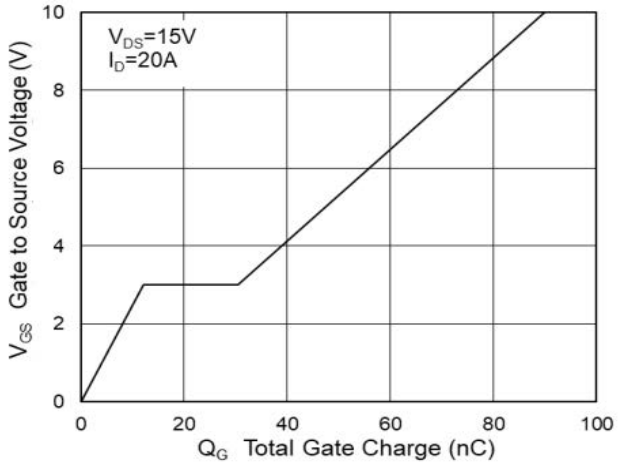

FIG.7-Gate Charge Characteristics

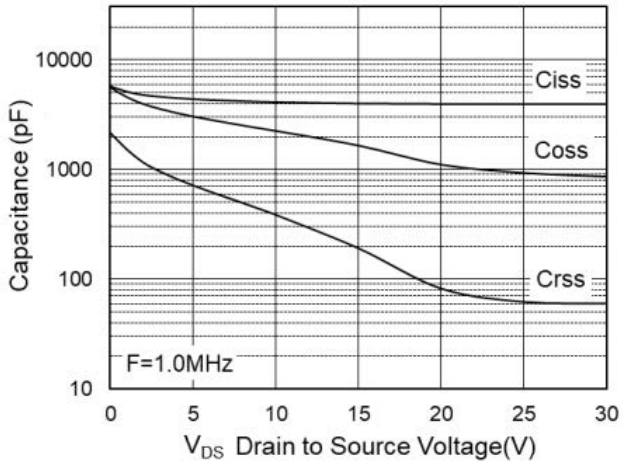

FIG.8-Capacitance Characteristics

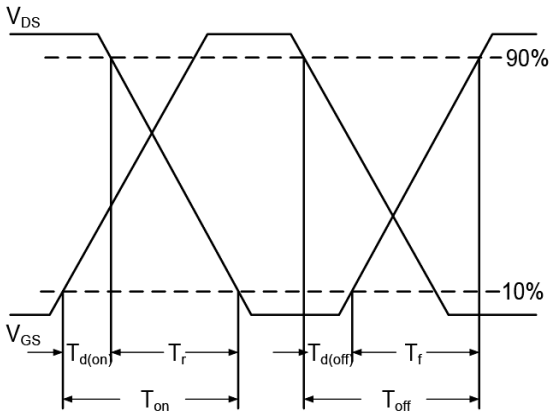

FIG.9-Switching Time Waveform

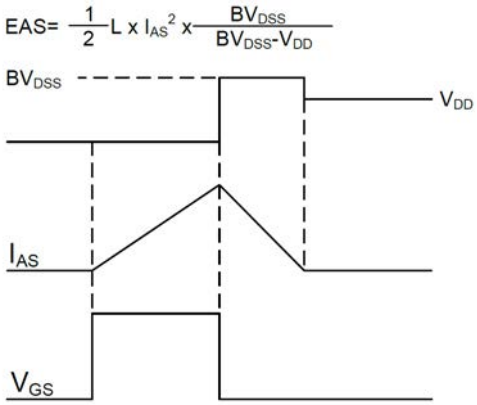

FIG.10-Unclamped Inductive Switching Waveform

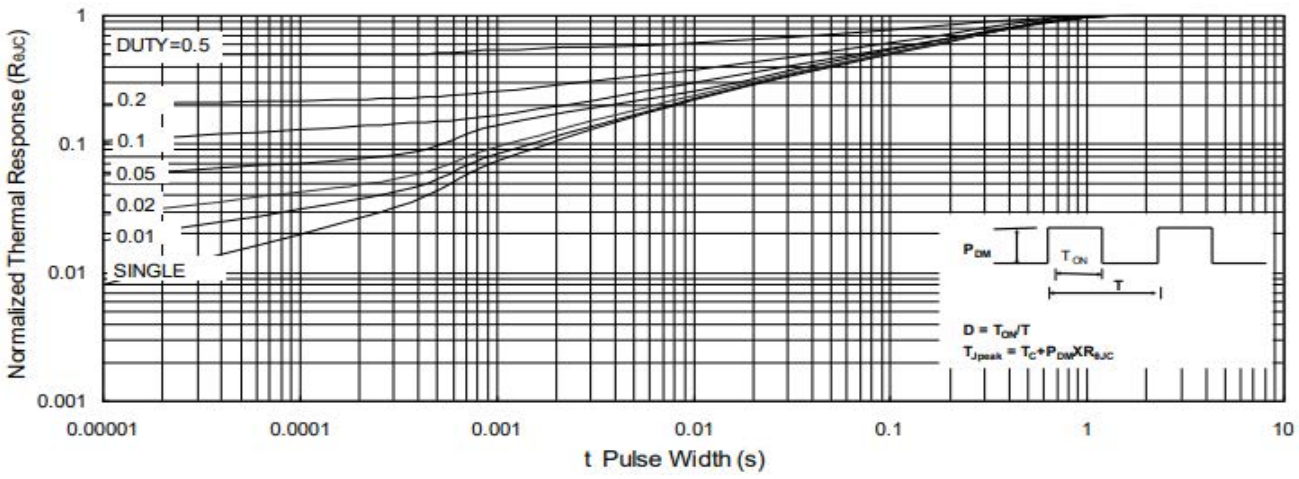

FIG.11-Normalized Maximum Transient Thermal Impedance

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