

MSHM40P40

P-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

- $R_{DS(ON)}=13m\Omega$ @ $V_{GS}=-10V$
- Fast switching
- Suit for -4.5V Gate Drive Applications
- 100% EAS Guaranteed
- Green Device

Typical Applications

- Notebook
- Load Switch
- Networking
- Hand-Held Instruments

Package type : PDFN 3.3X3.3

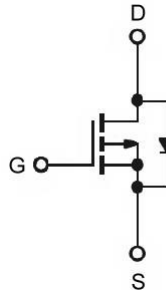
Packing & Order Information

3,000/Reel

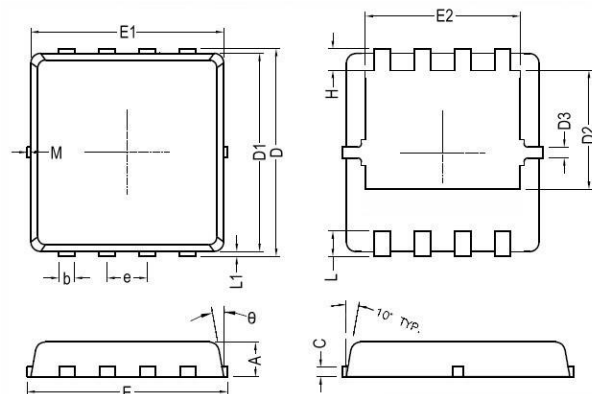


RoHS Compliant

Graphic Symbol

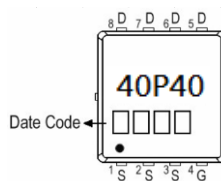


Package Dimension



REF.	Millimeter			REF.	Millimeter		
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.70	0.75	0.80	E1	3.00	3.15	3.20
b	0.25	0.30	0.35	E2	2.39	2.49	2.59
C	0.10	0.15	0.25	e	0.65 BSC		
D	3.25	3.35	3.45	H	0.30	0.39	0.50
D1	3.00	3.10	3.20	L	0.30	0.40	0.50
D2	1.78	1.88	1.98	L1	-	0.13	0.20
D3	-	0.13	-	θ	-	10°	12°
E	3.20	3.30	3.40	M	-	-	0.15

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 ¹ (T _C =25°C)	-40	A
	Continuous Drain Current ¹ (T _C =100°C)	-25	A
I _{DM}	Pulsed Drain Current ^{1,2}	-160	A
I _{AS}	Single Pulse Avalanche Current, L =0.1mH ³	-51	A
E _{AS}	Single Pulse Avalanche Energy, L =0.1mH ³	130	mJ
P _D	Power Dissipation ⁴ (T _C =25°C)	53	W
T _J /T _{STG}	Operating Junction and Storage Temperature	-55 to 150	°C

Thermal Resistance Ratings			
Symbol	Parameter	Value	Unit
R _{θJA}	Maximum Junction-to-Ambient ¹	60	°C/W
R _{θJC}	Maximum Junction-to-Case	3.2	°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	-1.0	-1.6	-2.5	V
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	-40	-	-	V
g _{fs}	Forward Transconductance	V _{DS} =-10V, I _D =-5A	-	23	-	S
I _{GSS}	Gate-Source Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-40V, V _{GS} =0V, T _J =25°C	-	-	-1	μA
		V _{DS} =-32V, V _{GS} =0V, T _J =55°C	-	-	-10	
R _{DS(on)}	Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-20A	-	10	13	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	15	21	
E _{AS}	Single Pulse Avalanche Energy ⁵	V _{DD} =25V, L =0.1mH, I _{AS} =40A	80	-	-	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	-	-	-40	A
I _{SM}	Pulsed Source Current ^{2,6}		-	-	-120	

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Dynamic and Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS} = -20V$	--	60	--	nC
Q_{gs}	Gate-Source Charge	$I_D = -20A$	--	8.6	--	
Q_{gd}	Gate-Drain Charge	$V_{GS} = -10V$	--	13.9	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS} = -20V$	--	18	--	ns
t_r	Rise Time	$R_L = 1\Omega$	--	4.8	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	88.5	--	
t_f	Fall Time	$R_G = 3\Omega$	--	26	--	
C_{iss}	Input Capacitance	$V_{DS} = -20V$	--	3257	--	pF
C_{oss}	Output Capacitance	$V_{GS} = 0V$	--	230	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	197	--	

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 $V_{DD} = -25V$, $V_{GS} = -10V$, $L = 0.1mH$, $I_{AS} = -51A$.
4. The power dissipation is limited by 150°C junction temperature.
5. The Min. value is 100% E_{AS} test guaranteed.
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

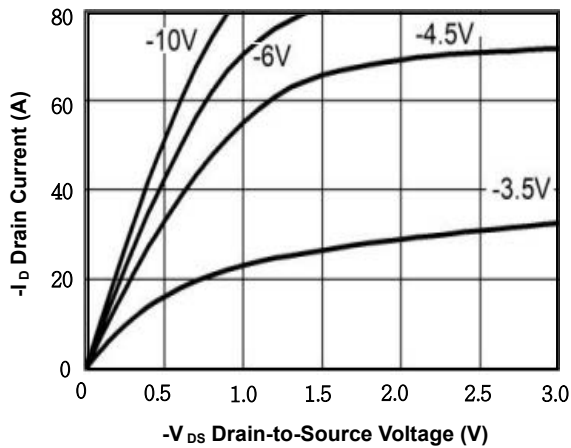


FIG.1-Typical Output Characteristics

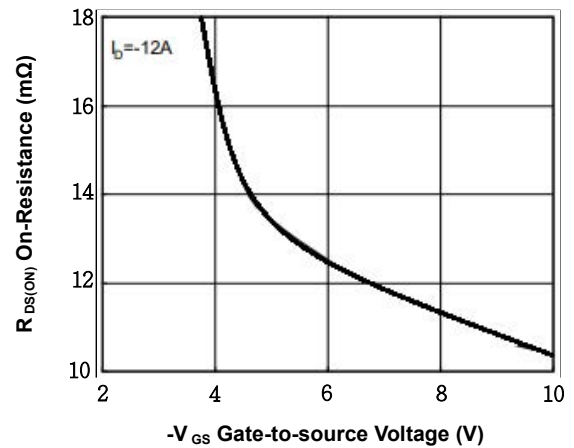


FIG.2- On-Resistance vs. G-S Voltage

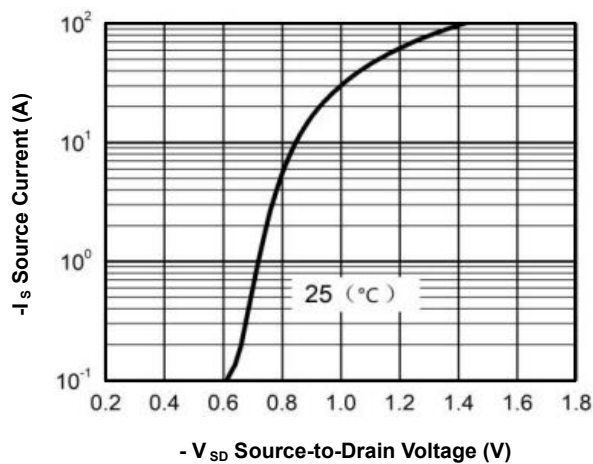


FIG.3- Source Drain Forward Characteristics

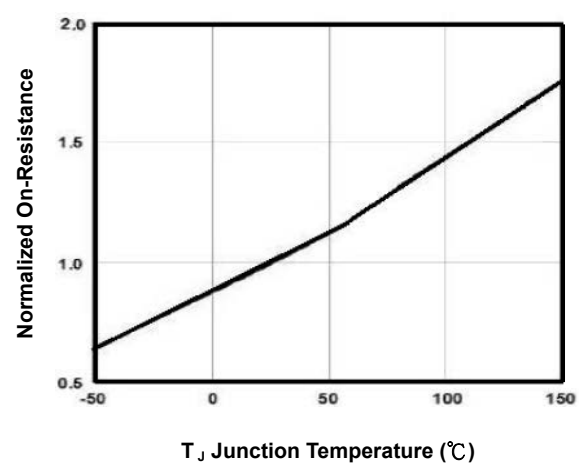


FIG.4-Normalized $R_{DS(on)}$ vs. T_J

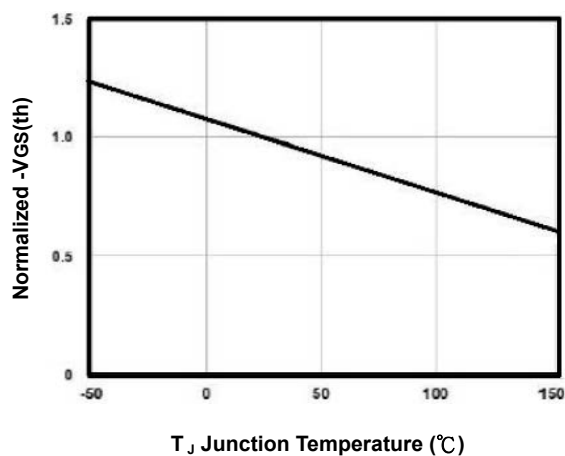


FIG.5- Normalized $-V_{GS(th)}$ vs. T_J

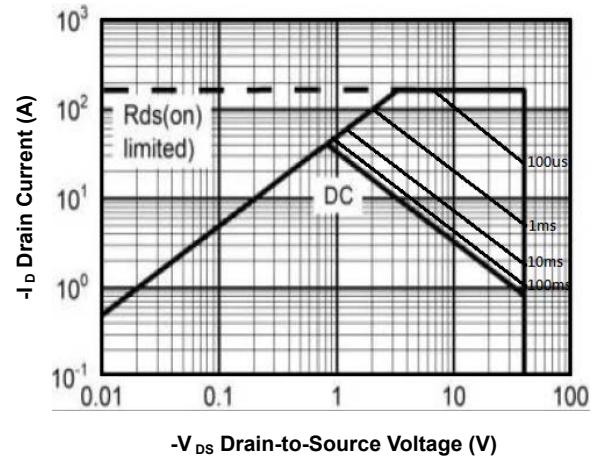


FIG.6-Safe Operating Area

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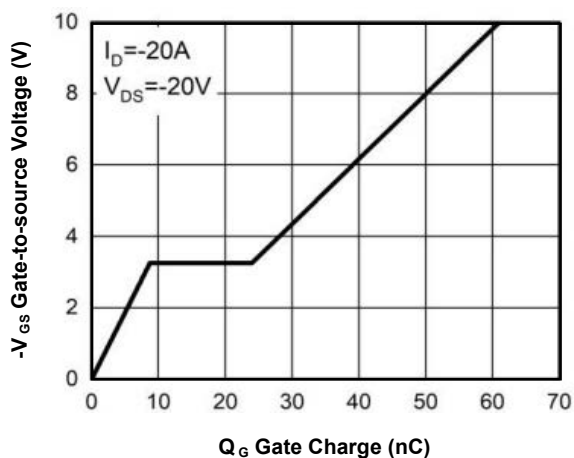


FIG.7-Gate Charge Characteristics

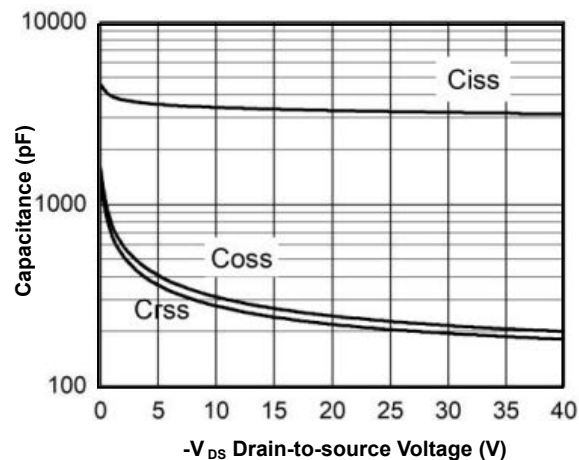


FIG.8-Capacitance Characteristics

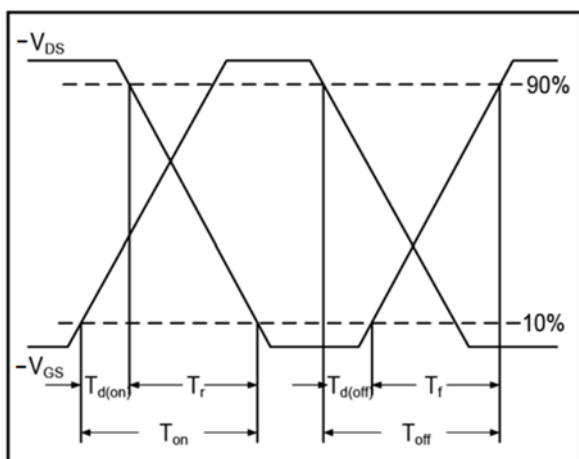


FIG.9-Switching Time Waveform

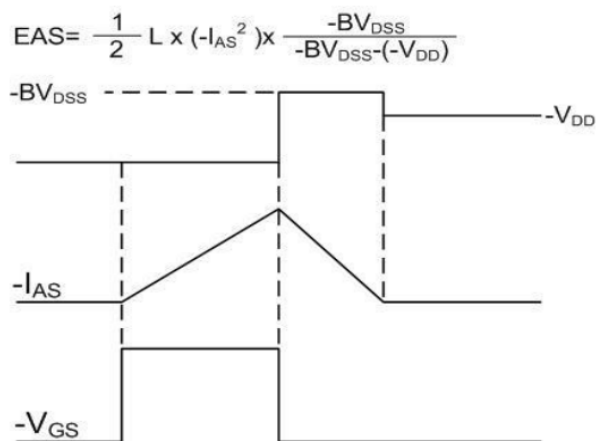


FIG.10-Unclamped Inductive Waveform

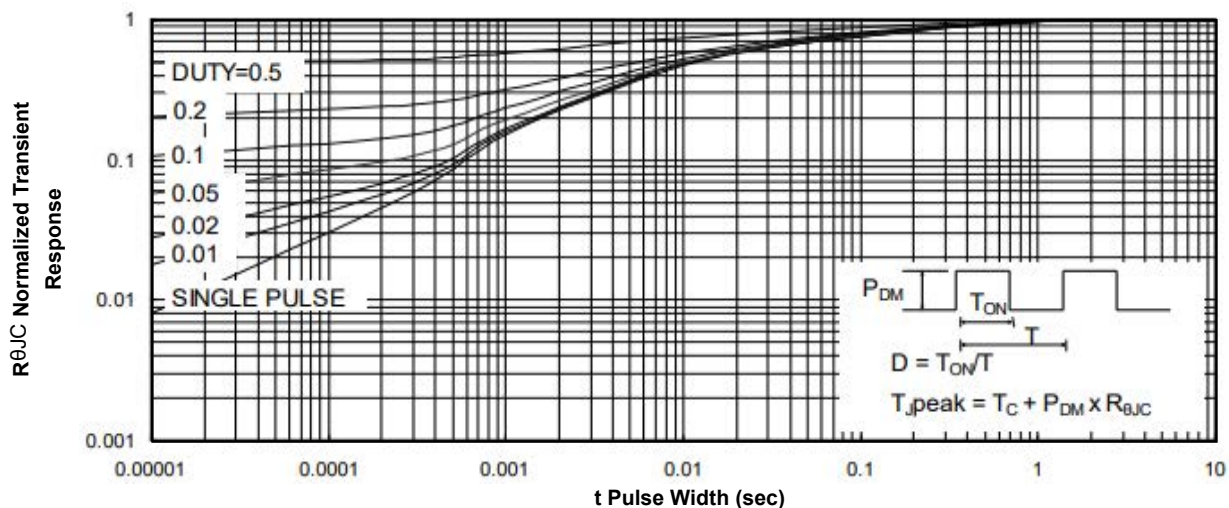


FIG.11-Normalized Maximum Transient Thermal Impedance

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