

MSH40N065

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.

The device meets the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

- $R_{DS(ON)} = 6.5m\Omega @ V_{GS} = 10V$
- Fast switching
- Improve dv/dt Capability
- 100% EAS Guaranteed
- Green Device Available

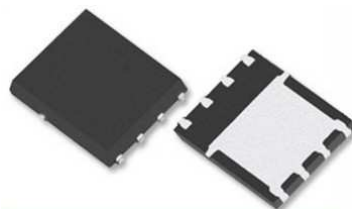
Typical Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Package type : PDFN 5X6

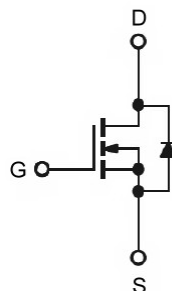
Packing & Order Information

3,000/Reel

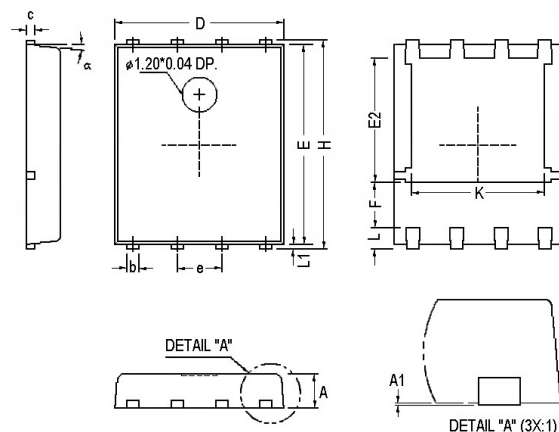


RoHS Compliant

Graphic Symbol

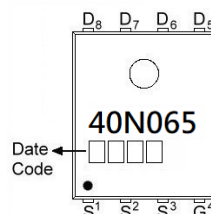


Package Dimension



REF.	Millimeter			REF.	Millimeter		
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.85	1.00	1.15	E	5.70	-	5.90
A1	0.00	-	0.10	e	-	1.27	-
b	0.30	-	0.51	H	5.90	-	6.20
c	0.20	-	0.30	L	-	0.60	-
D	4.80	-	5.00	L1	0.06	-	0.20
F	1.10 Ref.			α	0°	-	12°
E2	3.50 Ref.			K	3.70	3.90	4.10

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ¹ ($T_C=25^\circ\text{C}$)	75	A
	Continuous Drain Current ¹ ($T_C=100^\circ\text{C}$)	45	A
I_{DM}	Pulsed Drain Current ^{1,2}	300	A
I_{AS}	Single Pulse Avalanche Current, $L=0.1\text{mH}^3$	39	A
E_{AS}	Single Pulse Avalanche Energy, $L=0.1\text{mH}^3$	76	mJ
P_D	Power Dissipation ⁴ ($T_C=25^\circ\text{C}$)	83	W
	Power Dissipation ⁴ ($T_A=25^\circ\text{C}$)	2	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ¹	62.5	$^\circ\text{C/W}$
$R_{\theta JC}$	Maximum Junction-to-Case ¹	1.5	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.2	1.6	2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	40	-	-	V
g_{fs}	Forward Transconductance	$V_{DS}=3\text{V}$, $I_D=4.5\text{A}$	-	16	-	S
I_{GSS}	Gate-Source Leakage Current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$	-	-	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=40\text{V}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=32\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$	-	-	10	
$R_{DS(on)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10\text{V}$, $I_D=20\text{A}$	-	5.6	6.5	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=10\text{A}$	-	6.9	8.5	
E_{AS}	Single Pulse Avalanche Energy ⁵	$V_{DD}=25\text{V}$, $L=0.1\text{mH}$, $I_{AS}=25\text{A}$	31	-	-	mJ
V_{SD}	Diode Forward Voltage ²	$I_S=20\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	-	-	1.2	V
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0\text{V}$, Force Current	-	-	75	A
I_{SM}	Pulsed Source Current ^{2,6}		-	-	150	

Notes

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
3. The EAS data shows maximum rating. The test condition is $V_{DD}=25\text{V}$, $V_{GS}=10\text{V}$, $L=0.1\text{mH}$, $I_{AS}=39\text{A}$.
4. The power dissipation is limited by 150°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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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS}=20V$ $I_D=10A$ $V_{GS}=4.5V$	--	16.2	--	nC
Q_{gs}	Gate-Source Charge		--	3.85	--	
Q_{gd}	Gate-Drain Charge		--	6.05	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS}=15V$ $I_D=1A$ $V_{GS}=10V$ $R_G=6\Omega$	--	13.6	--	ns
t_r	Rise Time		--	2.5	--	
$t_{d(off)}$	Turn-Off Delay Time		--	68	--	
t_f	Fall Time		--	5	--	
C_{ISS}	Input Capacitance	$V_{DS}=25V$ $V_{GS}=0V$ $f=1.0MHz$	--	1540	--	pF
C_{OSS}	Output Capacitance		--	171	--	
C_{RSS}	Reverse Transfer Capacitance		--	115	--	
R_g	Gate Resistance	$V_{GS}=V_{DS}=0V, f=1.0MHz$	--	1.4	--	Ω

- Typical Electrical Characteristics

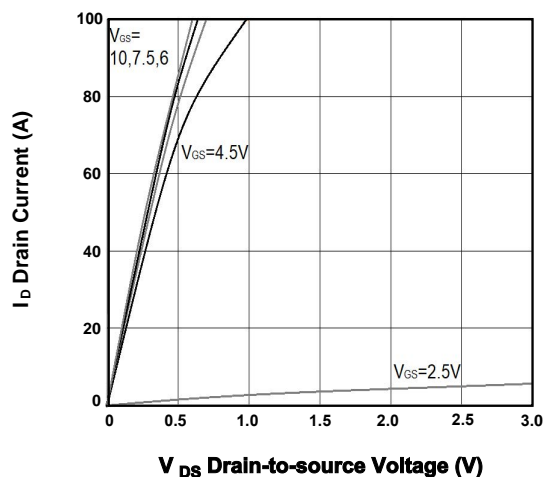


FIG.1-Typical Output Characteristics

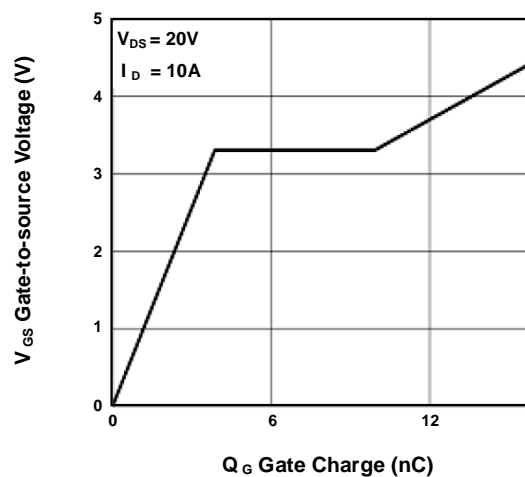


FIG.2-Gate Charge Characteristics

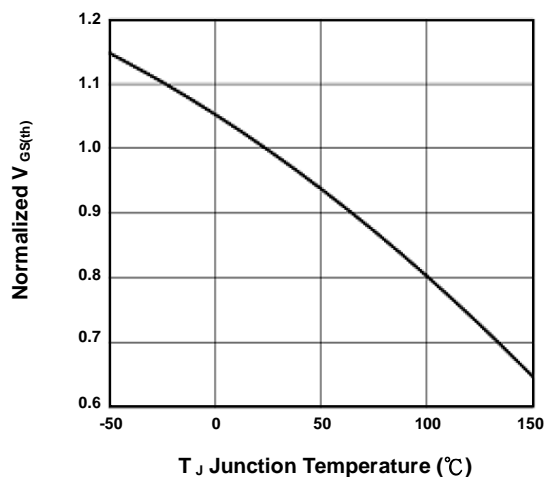


FIG.3-Normalized $V_{GS(th)}$ vs. T_J

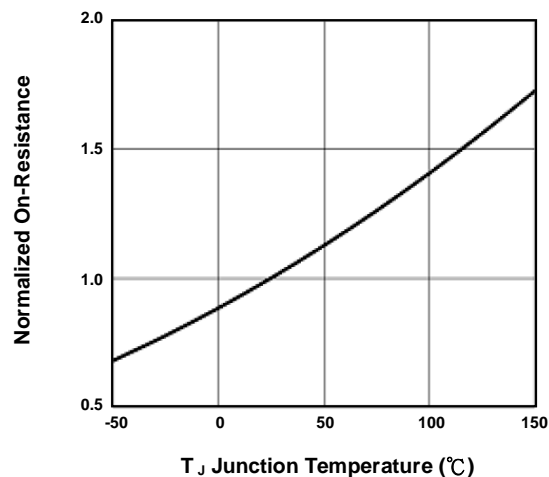


FIG.4-Normalized $R_{DS(on)}$ vs. T_J

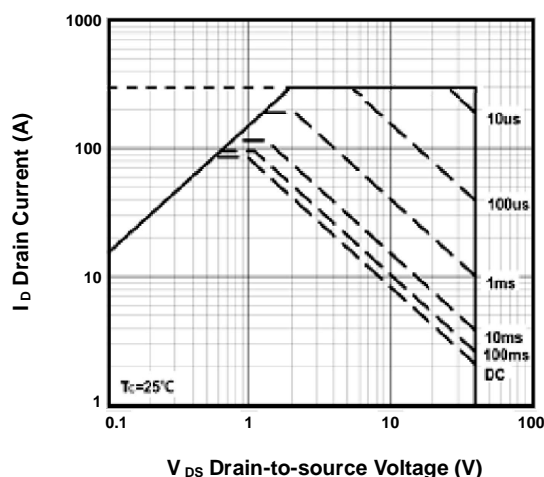


FIG.5-Safe Operating Area

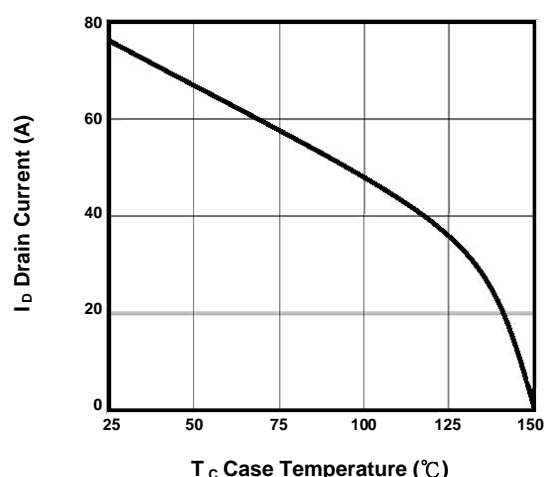


FIG.6-Drain Current vs. T_C

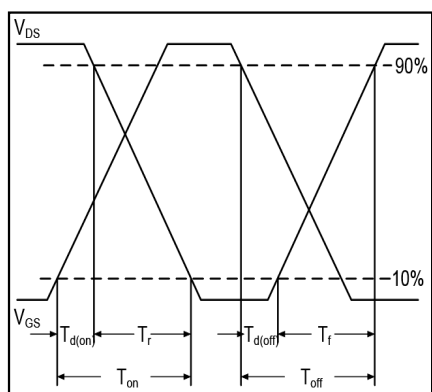


FIG.7-Switching Time Waveform

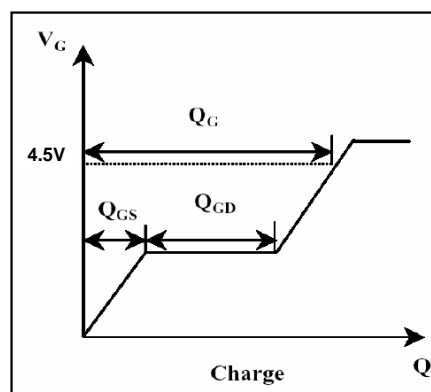


FIG.8-Gate Charge Waveform

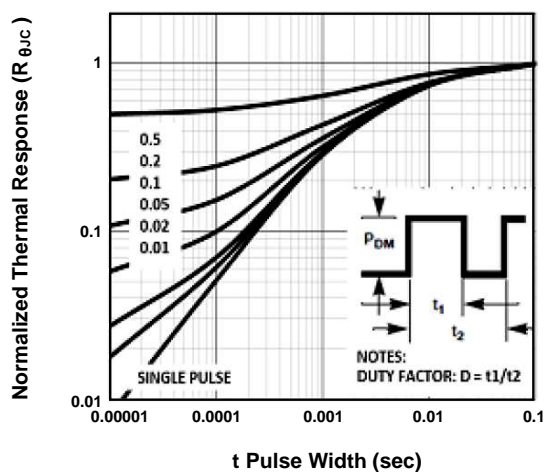


FIG.9-Transient Thermal Impedance

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