MSH40P78AU

P-Channel 40-V (D-S) MOSFET

Description

The device is using trench DMOS technology. This advanced technology has been especially tailored to minimize RDS(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

- RDS(ON) = 5.6mΩ @ VGS =-10V
- Fast switching
- Improve dv/dt Capability
- 100% EAS Guaranteed
- Green Device Available

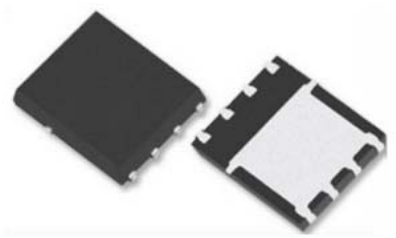
Typical Applications

- Motor Drive
- LED Lighting
- Hand-held Device

Package type：PDFN 5X6

Packing & Order Information

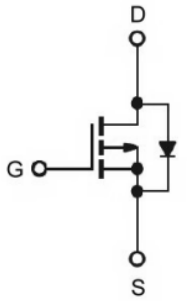
3,000/Reel



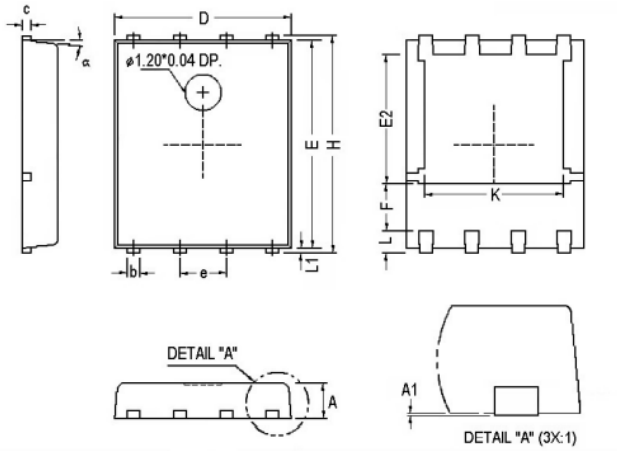
AEC-Q101 Qualification Available

RoHS Compliant

Graphic Symbol

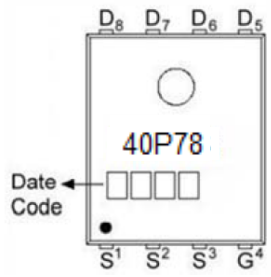


Package Dimension



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°C)	-78	A
	Continuous Drain Current[1] (T_C =100°C)	-48	A
I_{DM}	Pulsed Drain Current[1,2]	-230	A
I_{AS}	Single Pulse Avalanche Current, L =0.1mH[3]	-60	A
E_{AS}	Single Pulse Avalanche Energy, L =0.1mH[3]	180	mJ
P_D	Power Dissipation[4] (T_C =25°C)	160	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +175	°C

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient[1]	62	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case[1]	1	°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	-	-2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} =0V, I_D =-250μA	-40	-	-	V
g_{fs}	Forward Transconductance	V_{DS} =-15V, I_D =-12A	-	50	-	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 V_{DS} =-32V, V_{GS} =0V, T_J =55°C	-	-	-1 -20	μA
$R_{DS\ (on)}$	Drain-Source On-Resistance[2]	V_{GS} =-10V, I_D =-20A V_{GS} =-4.5V, I_D =-12A	- -	4.3 5.9	5.6 7.8	mΩ
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=-25V,L=0.1mH,I_{AS}=-42A	88	-	-	mJ
V_{SD}	Diode Forward Voltage[2]	IS = -1 A,VGS = 0, V T_J =25°C	-	-	-1.2	V
I_S	Continuous Source Current[1,6]	V_G =V_D =0V, Force Current	-	-	-78	A

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 ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows maximum rating. The test condition is VDD=-25V,VGS=-10V,L=0.1mH,IAS=-60A
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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Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge[2]	VDS = -20 V, VGS =-4.5 V, ID = -12 A	--	109	--	nC
Q_{gs}	Gate-Source Charge		--	35	--	
Q_{gd}	Gate-Drain (“Miller”) Charge		--	32	--	
$t_{d(on)}$	Turn-On Delay Time[2]	VDS = -20 V, ID = -12 A, VGS = -10 V, RG = 6 Ω	--	19	--	ns
t_r	Rise Time		--	26	--	
$t_{d(off)}$	Turn-Off Delay Time		--	249	--	
t_f	Fall Time		--	83	--	
C_{ISS}	Input Capacitance	VDS = -15 V, VGS = 0 V, f = 1 Mhz	--	6637	--	pF
C_{OSS}	Output Capacitance		--	755	--	
C_{RSS}	Reverse Transfer Capacitance		--	500	--	

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- **Typical Electrical Characteristics**

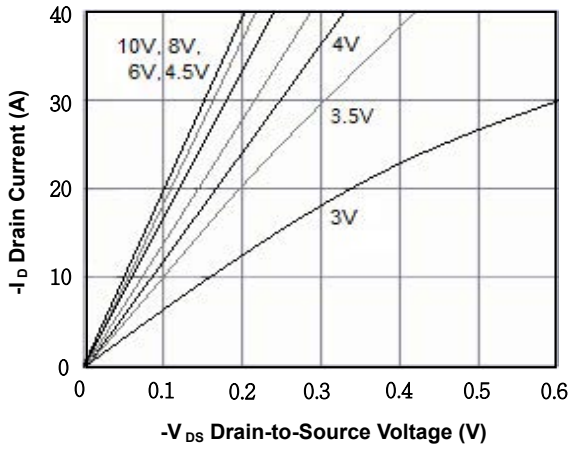

FIG.1-Typical Output Characteristics

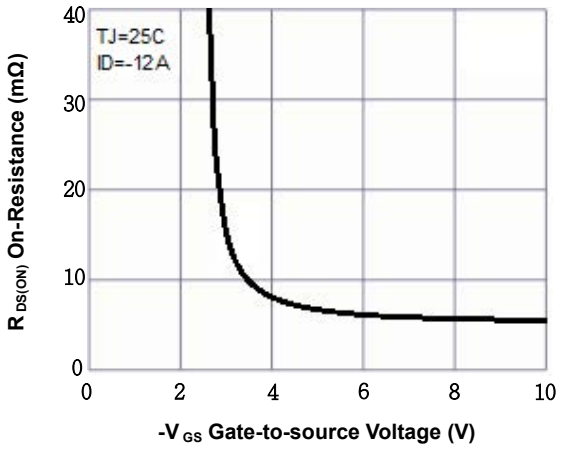

FIG.2- On-Resistance vs. G-S Voltage

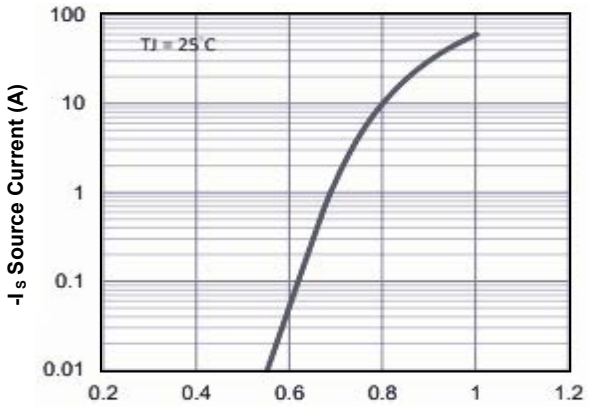

FIG.3- Source Drain Forward Characteristics

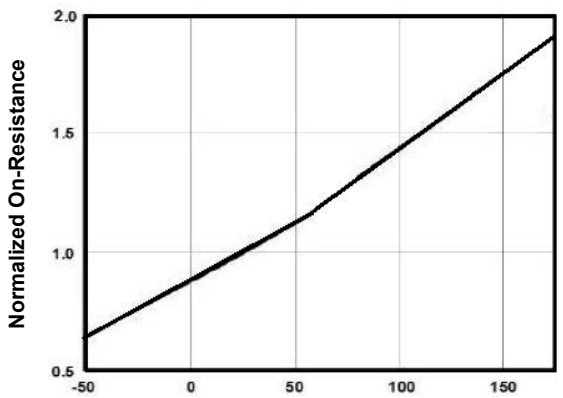

FIG.4-Normalized R_{DSON} vs. T_J

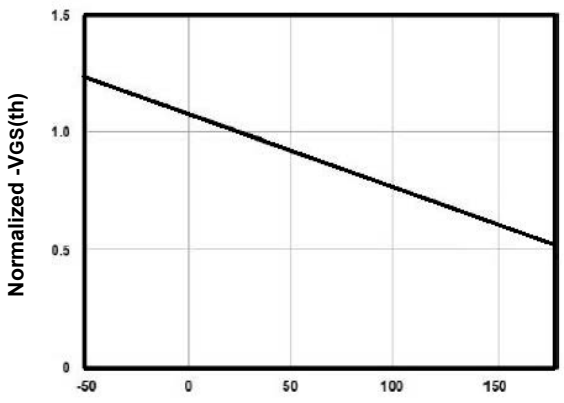

FIG.5- Normalized -V_{GS}(th) vs. T_J

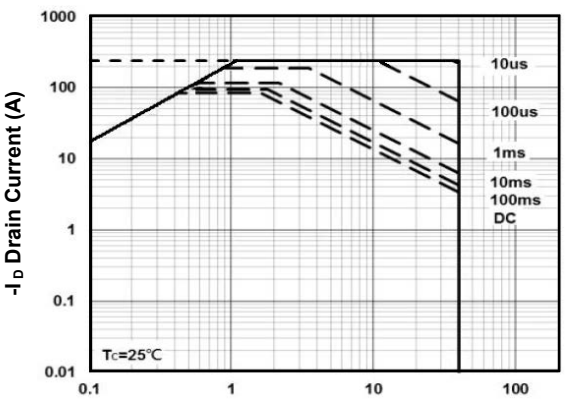

FIG.6-Safe Operating Area

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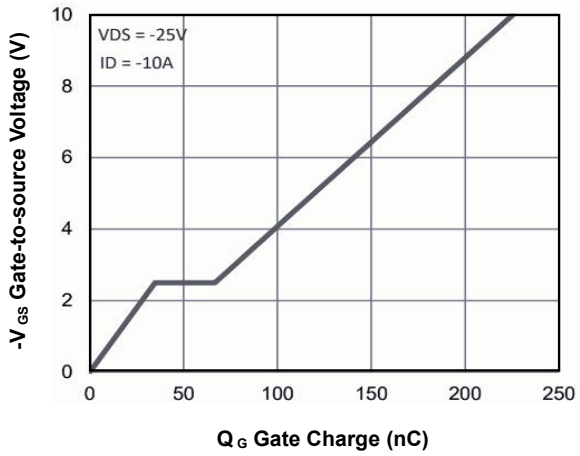

FIG.7-Gate Charge Characteristics

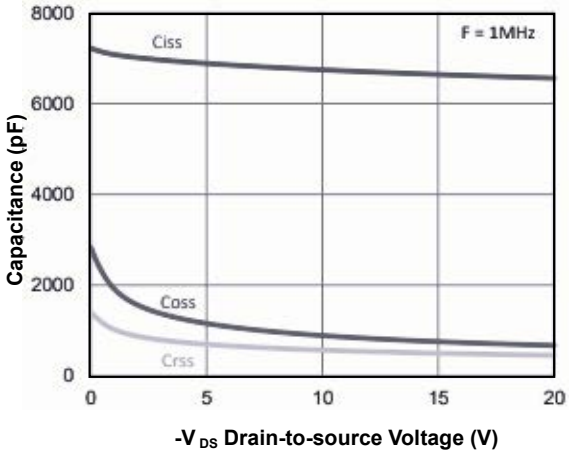

FIG.8-Capacitance Characteristics

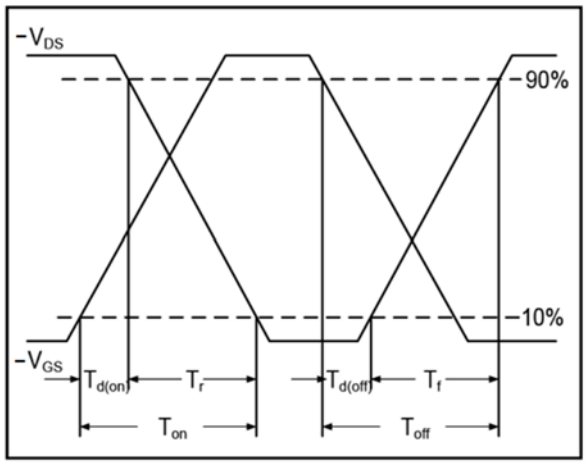

FIG.9-Switching Time Waveform

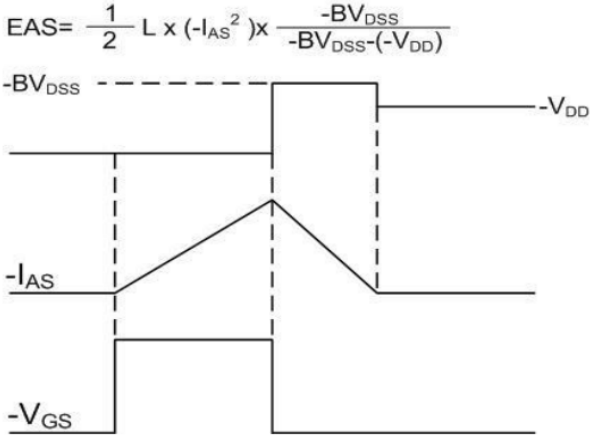

FIG.10-Unclamped Inductive Waveform

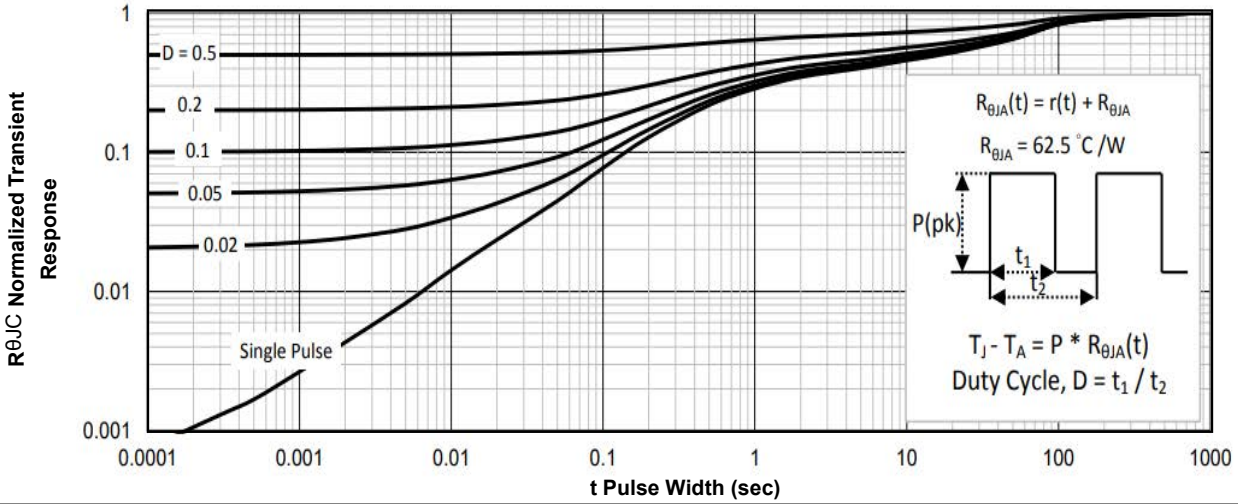

FIG.11-Normalized Maximum Transient Thermal Impedance

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