

MSQ30P40D

Dual P-Channel 30-V (D-S) MOSFET

Description

The device is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

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

Features

- $R_{DS(ON)} = 30m\Omega @ V_{GS} = -10V$
- $R_{DS(ON)} = 40m\Omega @ V_{GS} = -4.5V$
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

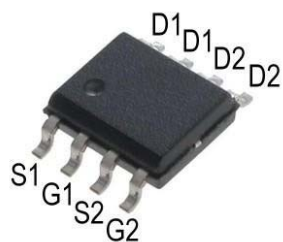
Typical Applications

- MB / VGA / Vcore
- POL Applications
- Load Switch
- LED Applications

Package type : SOP-8

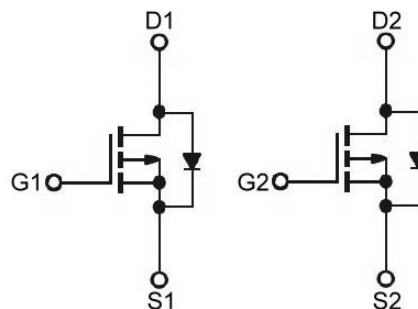
Packing & Order Information

3,000/Reel

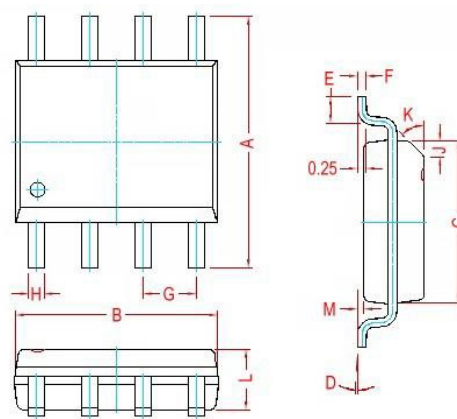


RoHS Compliant

Graphic Symbol

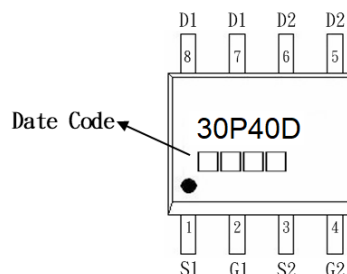


Package Dimension



REF.	Min.	Max.	REF.	Min.	Max.
A	5.80	6.20	M	0.10	0.25
B	4.80	5.00	H	0.35	0.51
C	3.80	4.00	L	1.35	1.75
D	0°	8°	J	0.40 Ref.	
E	0.40	0.90	K	45° Ref.	
F	0.19	0.26	G	1.27 Typ.	

Marking



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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings			
Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ¹ ($T_A = 25^\circ\text{C}$)	-6	A
	Continuous Drain Current ¹ ($T_A = 70^\circ\text{C}$)	-5	A
I_{DM}	Pulsed Drain Current ^{1,2}	-26	A
I_{AS}	Single Pulse Avalanche Current, $L = 0.1\text{mH}^3$	-30	A
E_{AS}	Single Pulse Avalanche Energy, $L = 0.1\text{mH}^3$	45	mJ
P_D	Power Dissipation ⁴ ($T_A = 25^\circ\text{C}$)	2.2	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	85	$^\circ\text{C/W}$
$R_{\theta JC}$	Maximum Junction-to-Case ¹	25	$^\circ\text{C/W}$

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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	-	-2.5	V
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250μA	-30	-	-	V
g _{fs}	Forward Transconductance	V _{DS} = -5V, I _D = -6A	-	17	-	S
I _{GSS}	Gate-Source Leakage Current	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
I _{DSS}	Drain-Source Leakage Current	V _{DS} = -24V, V _{GS} = 0V, T _J = 25°C V _{DS} = -24V, V _{GS} = 0V, T _J = 55°C	-	-	-1 -10	μA
R _{DS(on)}	Drain-Source On-Resistance ²	V _{GS} = -10V, I _D = -6A V _{GS} = -4.5V, I _D = -4A	- -	- -	30 40	mΩ
EAS	Single Pulse Avalanche Energy ⁵	V _{DD} = -25V, I _{AS} = -6A	5	-	-	mJ
V _{SD}	Diode Forward Voltage ²	I _S = -6A, V _{GS} = 0, V T _J = 25°C	-	-	-1.2	V
I _S	Continuous Source Current ^{1,6}	V _G = V _D = 0V, Force Current	-	-	-6	A
I _{SM}	Pulsed Source Current ^{2,6}		-	-	-26	A

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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS} = -15V$	--	11.4	--	nC
Q_{gs}	Gate-Source Charge	$I_D = -6A$	--	4.4	--	
Q_{gd}	Gate-Drain Charge	$V_{GS} = -4.5V$	--	4.3	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS} = -15V$	--	4.4	--	ns
t_r	Rise Time	$I_D = -6A$	--	14.6	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	40	--	
t_f	Fall Time	$R_G = 3.3\Omega$	--	19.3	--	
C_{iss}	Input Capacitance	$V_{DS} = -15V$	--	1220	--	pF
C_{oss}	Output Capacitance	$V_{GS} = 0V$	--	173	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	142	--	
R_g	Gate Resistance	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$	--	13	--	Ω

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 $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. The EAS data shows maximum rating. The test condition is $V_{DD} = -25V$, $V_{GS} = -10V$, $L = 0.1mH$, $I_{AS} = -26A$.
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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- Typical Electrical Characteristics

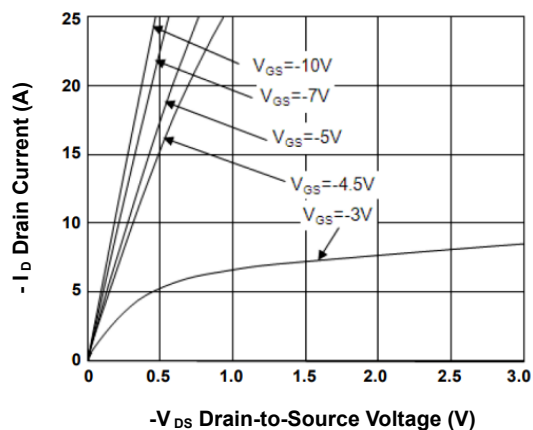


FIG.1-Output Characteristics $T_J=25^\circ\text{C}$

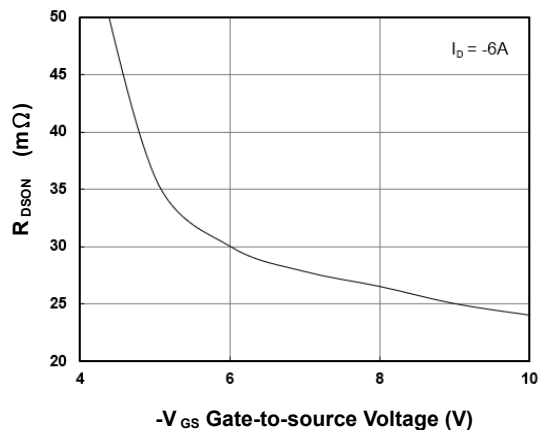


FIG.2-On-Resistance vs. G-S Voltage

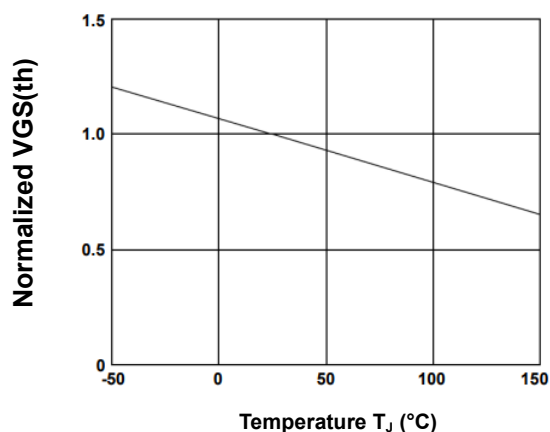


FIG.3- Normalized $V_{GS(th)}$ vs. T_J

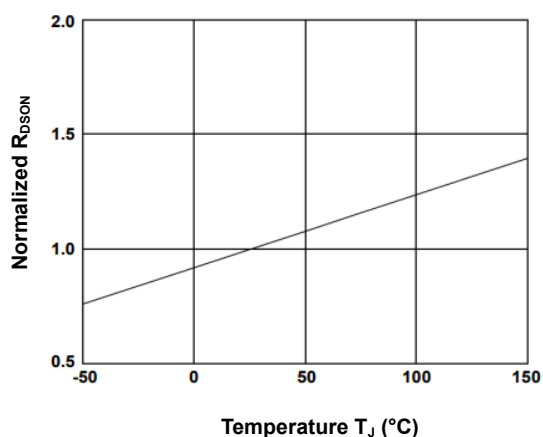


FIG.4-Normalized $R_{DS(on)}$ vs. Temperature T_J

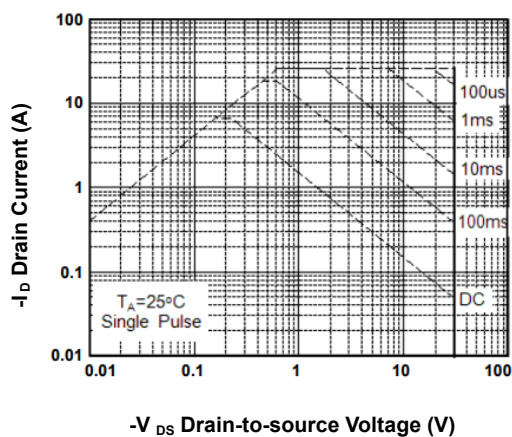


FIG.5- Safe Operating Area

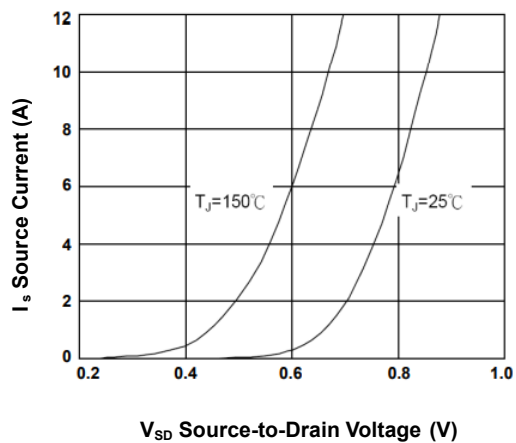
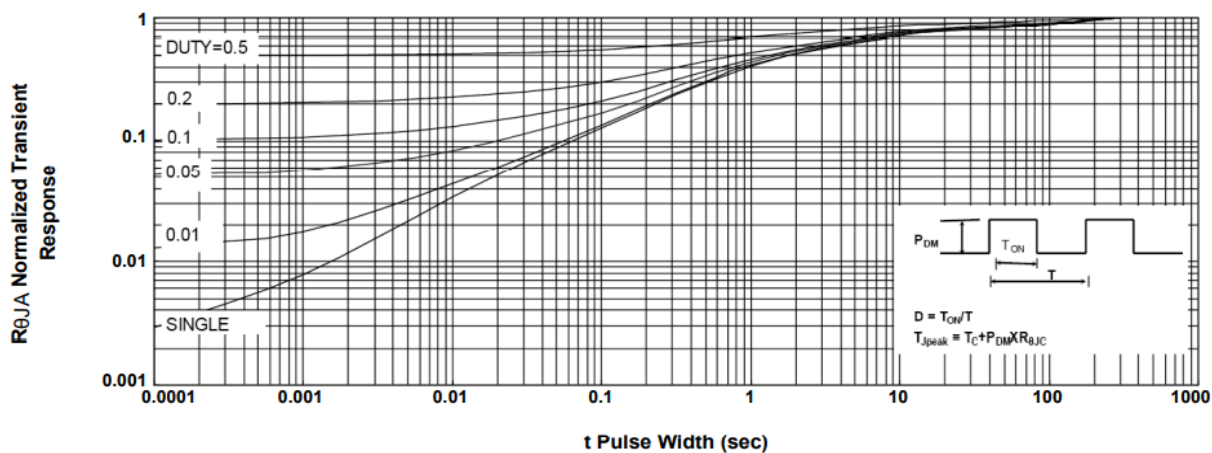
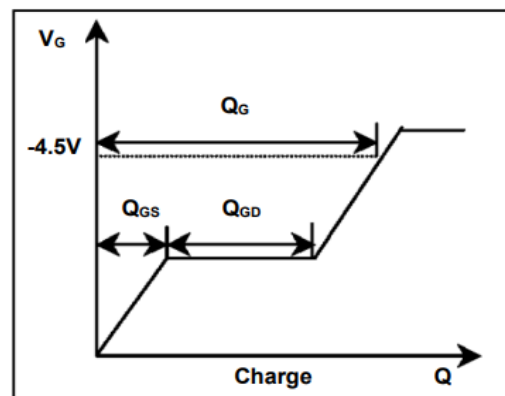
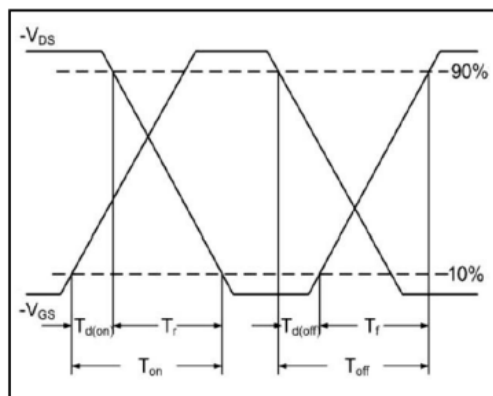
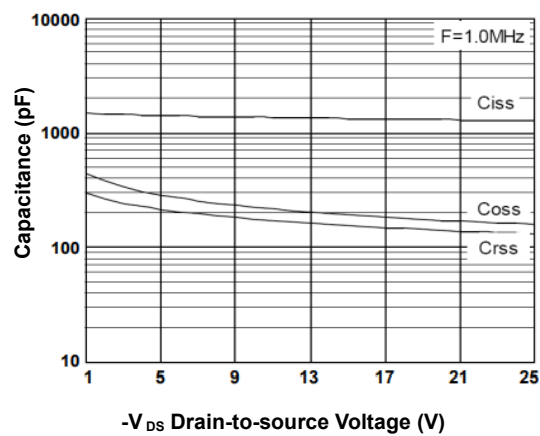
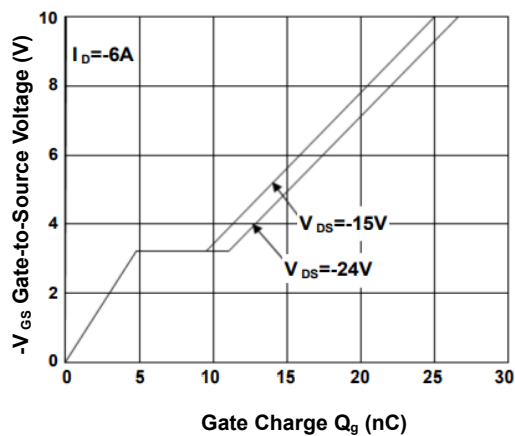


FIG.6- Forward Characteristics of Reverse

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- Typical Electrical Characteristics



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