

MSQ30P15

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

- $R_{DS(ON)} = 12m\Omega @ V_{GS} = -10V$
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

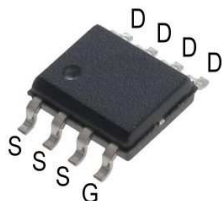
Typical Applications

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

Package type : SOP-8

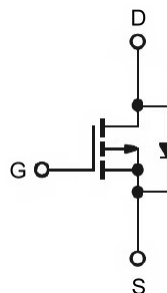
Packing & Order Information

3,000/Reel

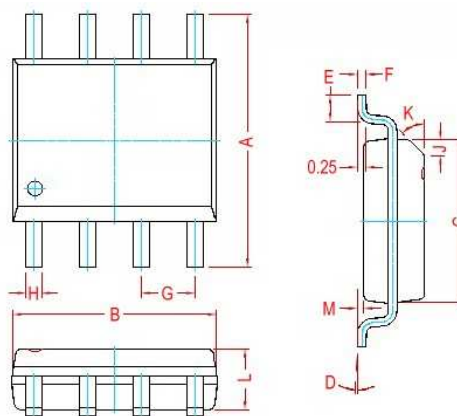


RoHS Compliant

Graphic Symbol

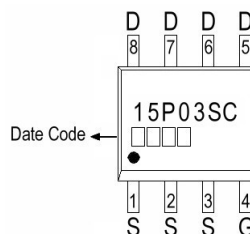


Package Dimension



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		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 ($T_C = 25^\circ\text{C}$)	-15	A
	Continuous Drain Current ¹ ($T_C = 70^\circ\text{C}$)	-12	A
I_{DM}	Pulsed Drain Current ^{1,2}	-45	A
I_D	Continuous Drain Current ¹ ($T_A = 25^\circ\text{C}$)	-9.0	A
	Continuous Drain Current ¹ ($T_A = 70^\circ\text{C}$)	-7.2	A
I_{AS}	Single Pulse Avalanche Current, $L = 0.1\text{mH}^3$	-46	A
E_{AS}	Single Pulse Avalanche Energy, $L = 0.1\text{mH}^3$	105	mJ
P_D	Power Dissipation ⁴ ($T_A = 25^\circ\text{C}$)	1.5	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	30	$^\circ\text{C/W}$

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	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$	-1.0	-	-2.5	V
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}$, $I_D = -250\mu\text{A}$	-30	-	-	V
g_{fs}	Forward Transconductance	$V_{DS} = -5\text{V}$, $I_D = -10\text{A}$	-	24	-	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	$V_{DS} = -24\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$	-	-	-1	μA
		$V_{DS} = -24\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 55^\circ\text{C}$	-	-	-5	μA
$R_{DS(on)}$	Static Drain-Source On-Resistance ²	$V_{GS} = -10\text{V}$, $I_D = -12\text{A}$	-	-	12	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}$, $I_D = -8\text{A}$	-	-	20	$\text{m}\Omega$
E_{AS}	Single Pulse Avalanche Energy ⁵	$V_{DD} = -25\text{V}$, $L = 0.1\text{mH}$, $I_{AS} = -33\text{A}$	54	-	-	mJ
V_{SD}	Diode Forward Voltage ²	$I_S = -12\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$	-	-	-1.2	V
I_S	Continuous Source Current ^{1,6}	$V_G = V_D = 0\text{V}$, Force Current	-	-	-15	A
I_{SM}	Pulsed Source Current ^{2,6}		-	-	-45	

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 E_{AS} data shows maximum rating. The test condition is $V_{DD} = -25\text{V}$, $V_{GS} = -10\text{V}$, $L = 0.1\text{mH}$, $I_{AS} = -46\text{A}$.
4. The power dissipation is limited by 150°C junction temperature.
5. The Min. value is 100% E_{AS} 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.

MSQ30P15

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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS} = -15V$	--	20	--	nC
Q_{gs}	Gate-Source Charge	$I_D = -10A$	--	5.1	--	
Q_{gd}	Gate-Drain Charge	$V_{GS} = -4.5V$	--	7.3	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DS} = -15V$	--	33.8	--	ns
t_r	Rise Time	$I_D = -1A$	--	35.8	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	72.8	--	
t_f	Fall Time	$R_G = 3.3\Omega$	--	10.5	--	
C_{ISS}	Input Capacitance	$V_{DS} = -15V$	--	2215	--	pF
C_{OSS}	Output Capacitance	$V_{GS} = 0V$	--	310	--	
C_{RSS}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	237	--	
R_g	Gate Resistance	$V_{GS} = V_{DS} = 0V, f = 1.0MHz$	--	9	--	Ω

- Typical Electrical Characteristics

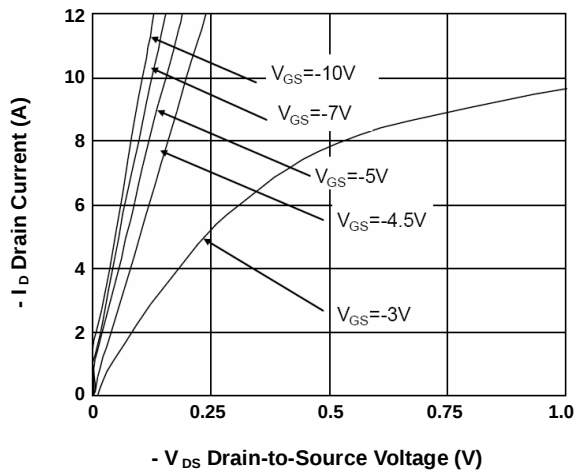


FIG.1-Typical Output Characteristics

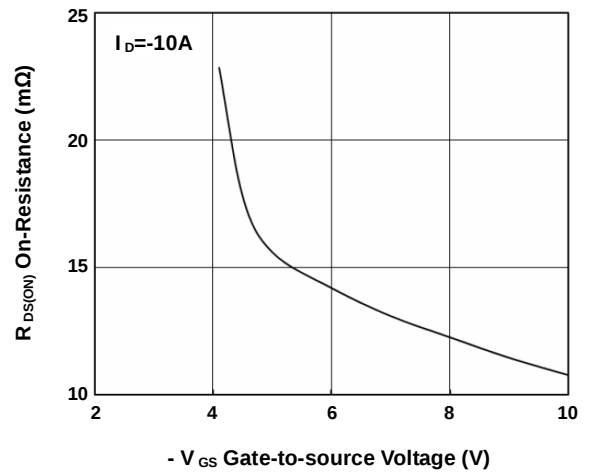


FIG.2-On-Resistance vs. G-S Voltage

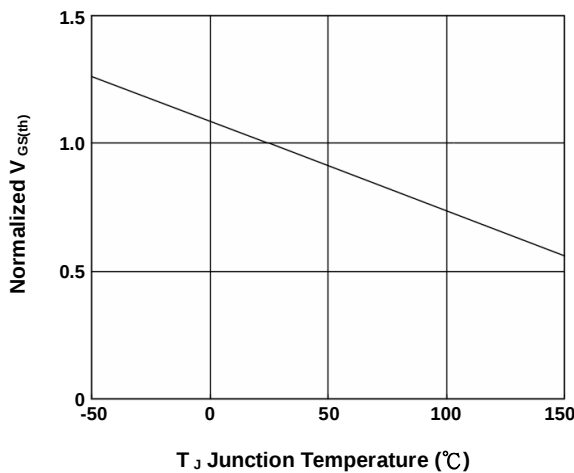


FIG.3-Normalized $V_{GS(th)}$ vs. T_J

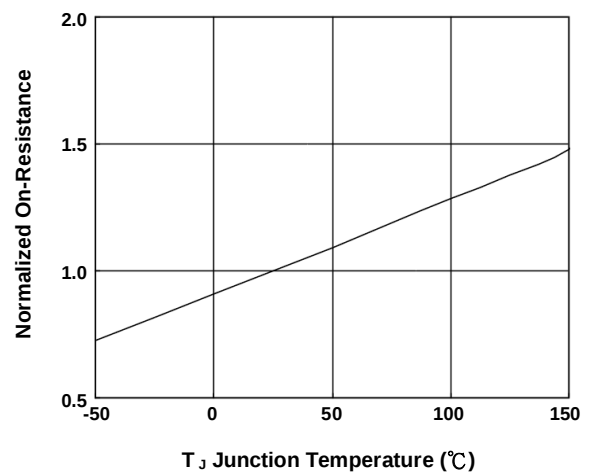


FIG.4-Normalized $R_{DS(on)}$ vs. T_J

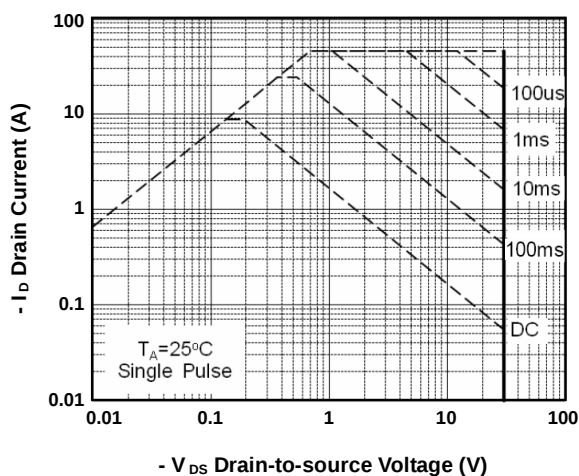


FIG.5-Safe Operating Area

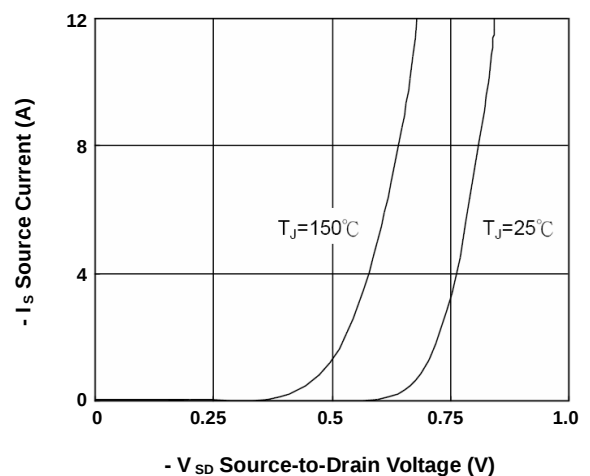


FIG.6-Forward Characteristics of Reverse

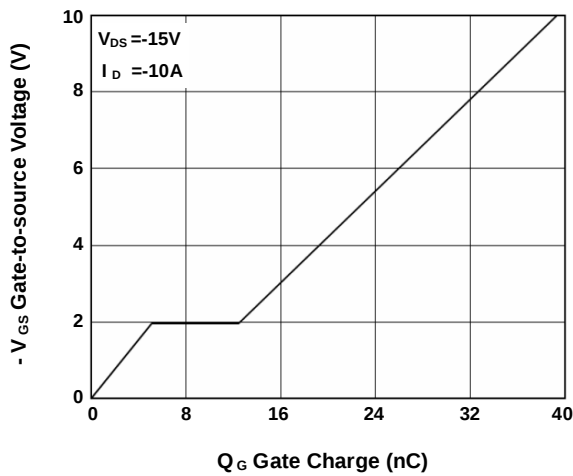


FIG.7-Gate Charge Characteristics

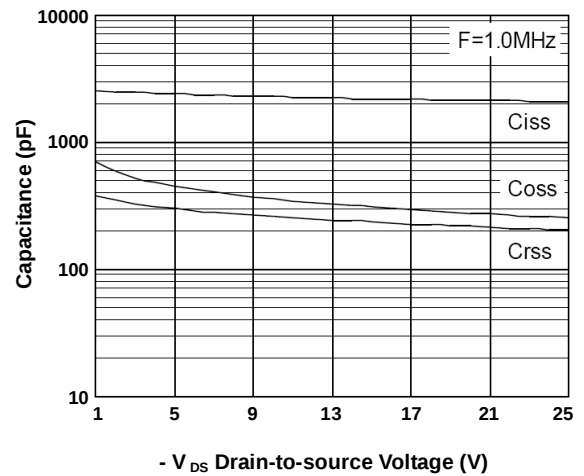


FIG.8-Capacitance Characteristics

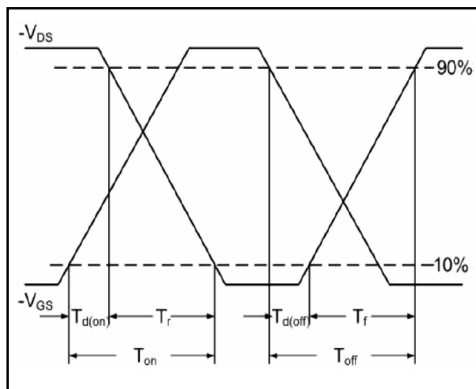


FIG.9-Switching Time Waveform

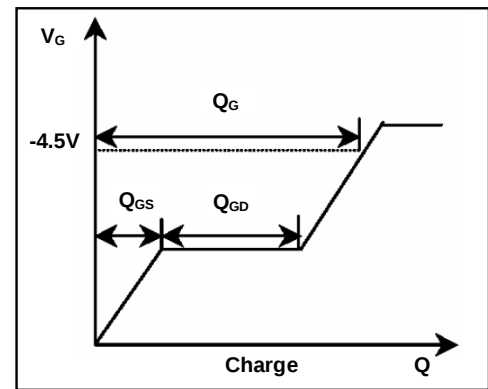


FIG.10-Gate Charge Waveform

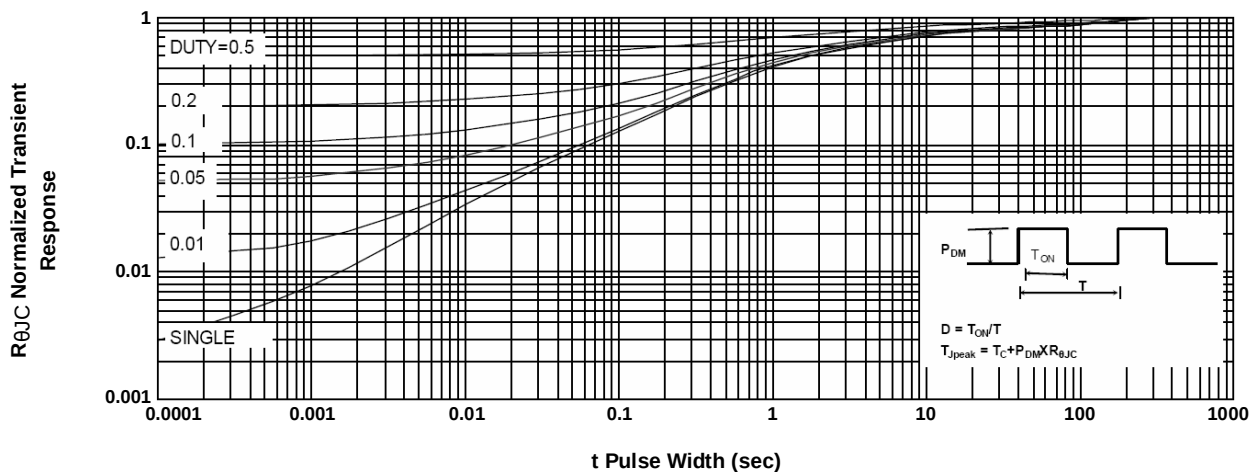


FIG.11-Normalized Maximum Transient Thermal Impedance

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