



Description

The MCG40N03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 30V$ $I_D = 45A$

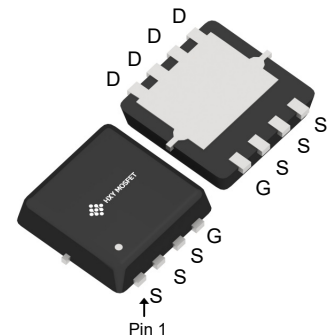
$R_{DS(ON)} < 8 m\Omega$ @ $V_{GS}=10V$

Application

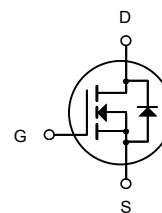
Battery protection

Load switch

Uninterruptible power supply



DFN3X3-8L



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
MCG40N03	DFN3X3-8L	HXY MOSFET	5000

Absolute Maximum Ratings (TC=25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, V_{GS} @ 10V ¹	45	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, V_{GS} @ 10V ¹	32	A
I_{DM}	Pulsed Drain Current ²	140	A
EAS	Single Pulse Avalanche Energy ³	115.2	mJ
I_{AS}	Avalanche Current	48	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	59	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.1	°C/W



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.027	---	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=20A$	---	6	8	$m\Omega$
		$V_{GS}=4.5V, I_D=10A$		7.5	10	
$V_{GS(th)}$	Gate Threshold Voltage		1.2	---	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	$V_{GS}=V_{DS}, I_D=250\mu A$	---	-5.8	---	$mV/^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=24V, V_{GS}=0V$, $T_J=55^{\circ}\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=30A$	---	43	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V$, $f=1MHz$	---	1.7	---	Ω
Q_g	Total Gate Charge (4.5V)	$V_{DS}=15V, V_{GS}=4.5V$, $I_D=15A$	---	20	---	nC
Q_{gs}	Gate-Source Charge		---	7.6	---	
Q_{gd}	Gate-Drain Charge		---	7.2	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V$, $R_G=3.3\Omega$, $I_D=15A$	---	7.8	---	ns
T_r	Rise Time		---	15	---	
$T_{d(off)}$	Turn-Off Delay Time		---	37.3	---	
T_f	Fall Time		---	10.6	---	
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V$, $f=1MHz$	---	2295	---	pF
C_{oss}	Output Capacitance		---	267	---	
C_{rss}	Reverse Transfer Capacitance		---	210	---	
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0V$, Force Current	---	---	45	A
I_{SM}	Pulsed Source Current ^{2,6}		---	---	140	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A$, $T_J=25^{\circ}\text{C}$	---	---	1	V

Diode Characteristics

Note :

- 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 Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=34A$
- 4.The power dissipation is limited by 150°C junction temperature
- 5 .The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



Typical Characteristics

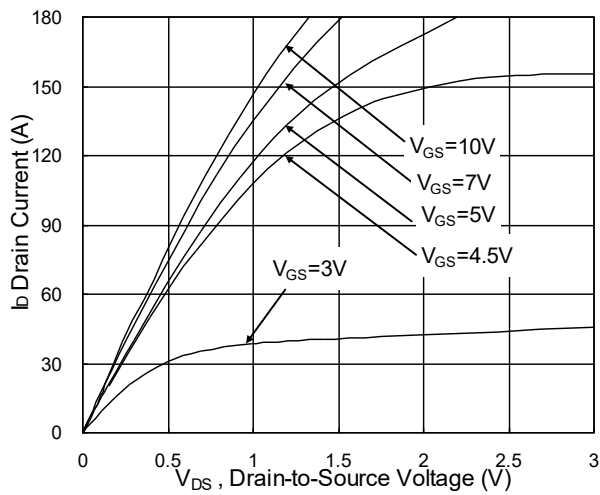


Fig.1 Typical Output Characteristics

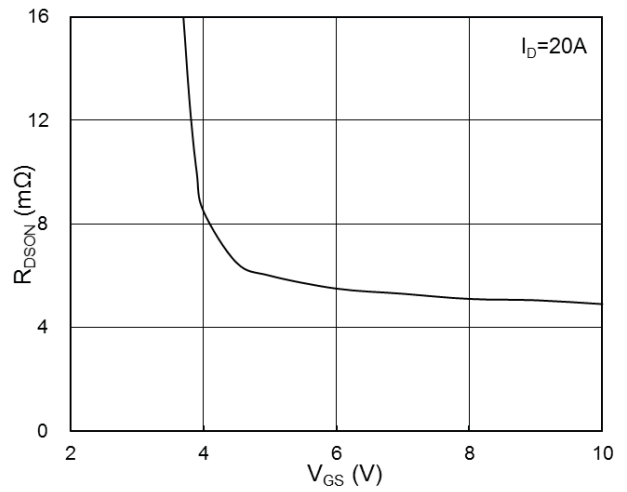


Fig.2 On-Resistance vs. G-S Voltage

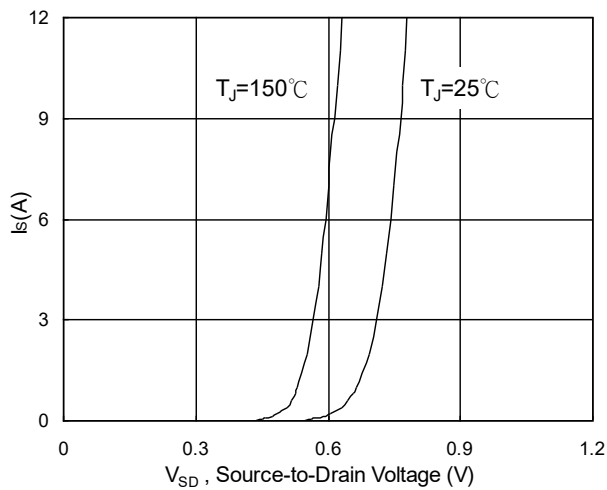


Fig.3 Forward Characteristics of Reverse

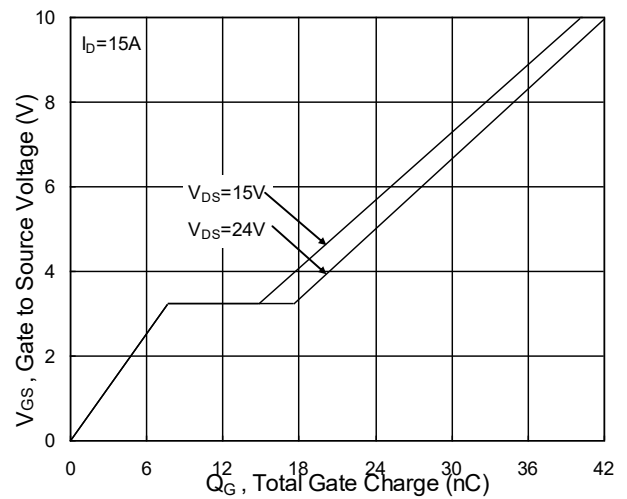


Fig.4 Gate-Charge Characteristics

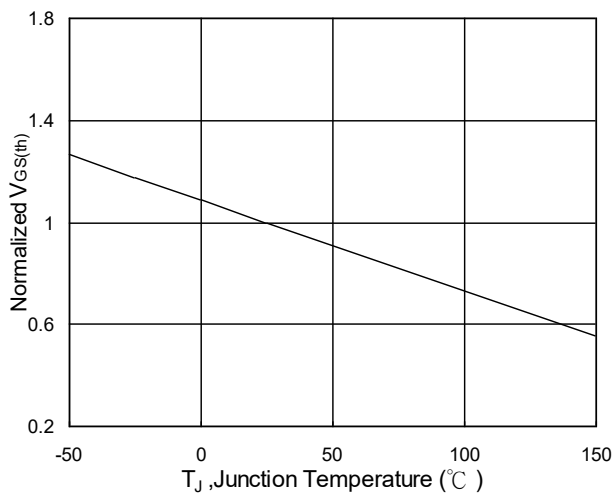


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

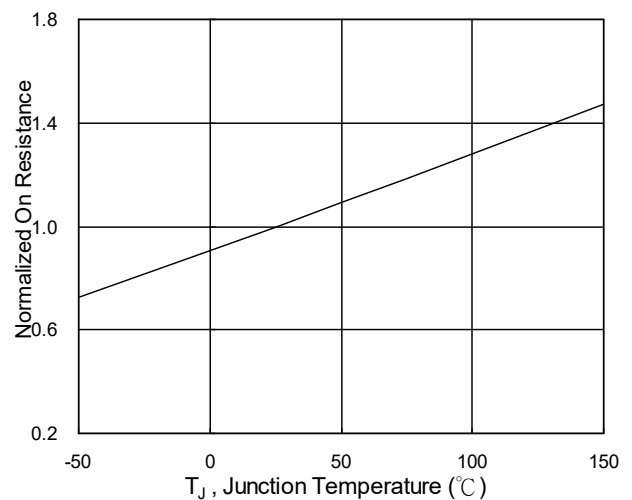


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

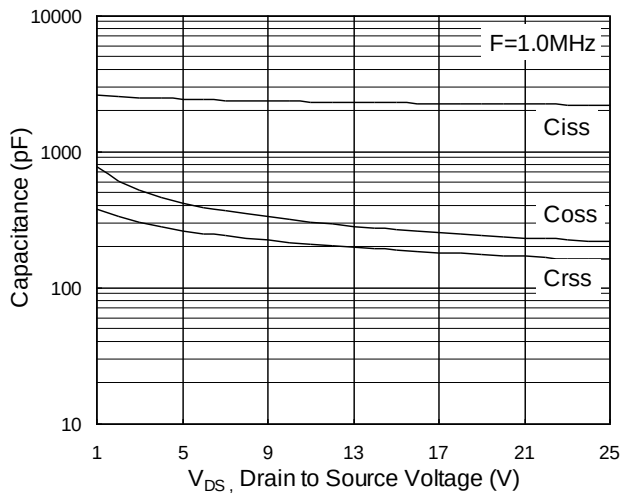


Fig.7 Capacitance

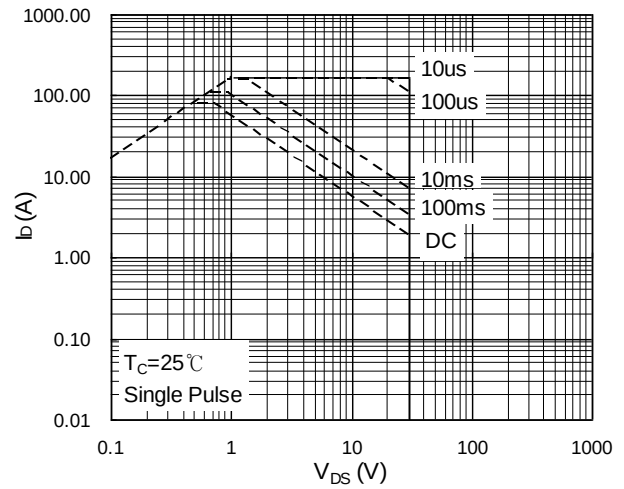


Fig.8 Safe Operating Area

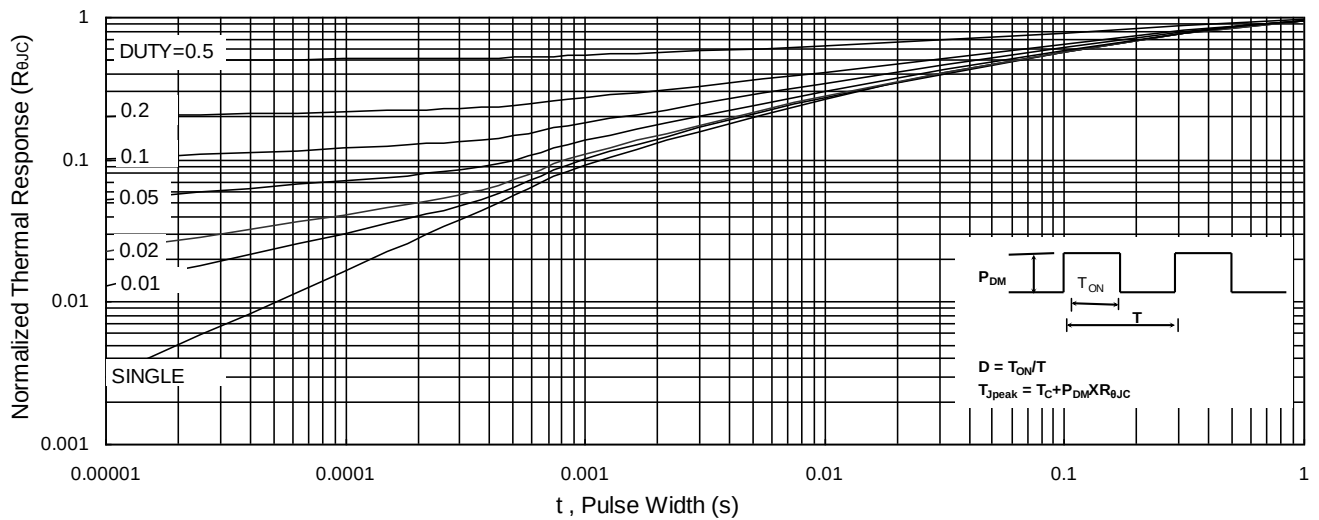


Fig.9 Normalized Maximum Transient Thermal Impedance

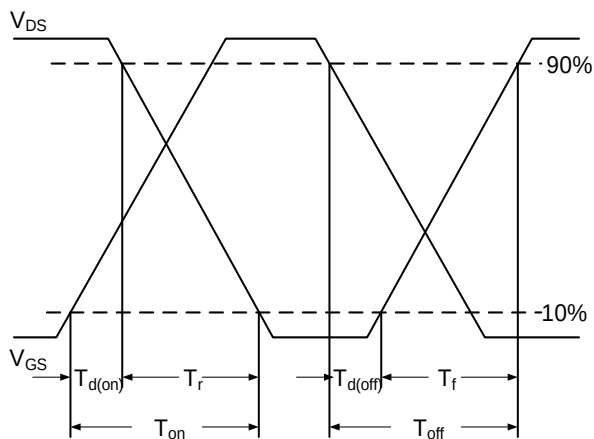


Fig.10 Switching Time Waveform

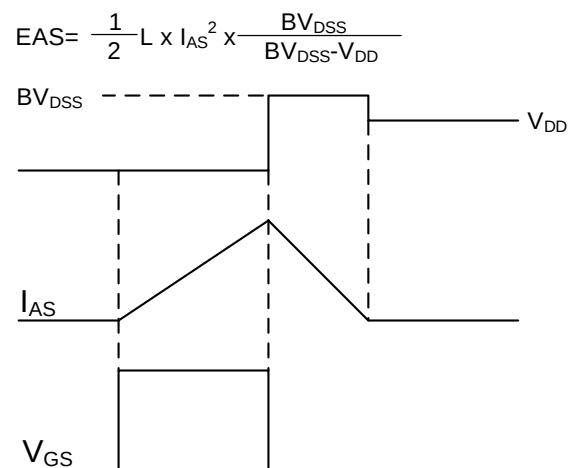
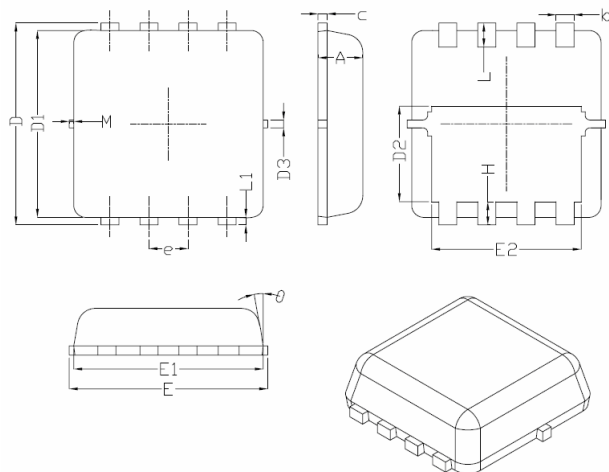


Fig.11 Unclamped Inductive Switching Waveform



DFN3X3-8L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	-	0.13	-
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	-	0.13	-
M	*	*	0.15
θ		10°	12°



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