GOODWORK

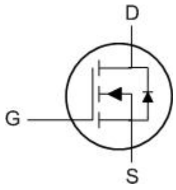
60N03

N-Ch 60V Fast Switching MOSFETs

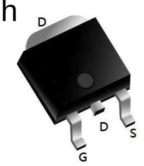
Description

The 60N03 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 60N03 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.



Super Low Gate Charge
100% EAS Guaranteed
Green Device Available
Excellent CdV/dt effect decline
Advanced high cell density Trench technology

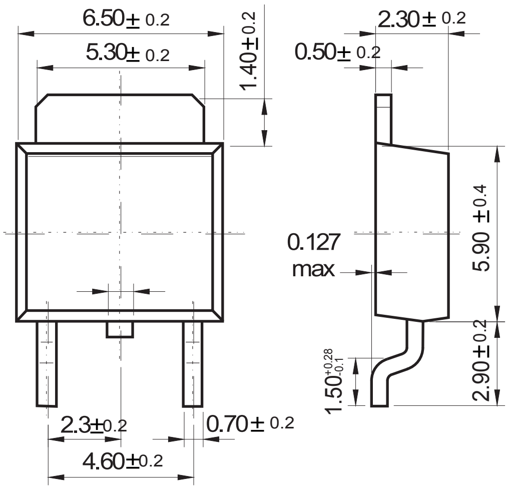


Product Summary

BVDSS	RDSON	ID
30V	4.3mΩ	60 A

TO-252

Unit: mm



Dimensions in inches and (millimeters)

Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
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]	60		A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V[1]	50		A
$I_D@T_A=25^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V[1]	30	19	A
$I_D@T_A=70^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V[1]	25	16	A
I_{DM}	Pulsed Drain Current[2]	192		A
EAS	Single Pulse Avalanche Energy[3]	144.7		mJ
I_{AS}	Avalanche Current	53.8		A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation[4]	62.5		W
$P_D@T_A=25^{\circ}C$	Total Power Dissipation[4]	6	2.42	W
T_{STG}	Storage Temperature Range	-55 to 175		˚C
T_J	Operating Junction Temperature Range	-55 to 175		˚C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	62	˚C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1] (t ≤10s)	---	25	˚C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	2.4	˚C/W

60N03

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30	---	---	V
$\triangle BV_{DSS}/\triangle T$	BVDSS Temperature Coefficient	Reference to 25˚C , I_D=1mA	---	0.0213	---	V/˚C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	4.3	6	mΩ
		V_{GS}=4.5V , I_D=15A	---	7.8	9	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	1.5	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.73	---	mV/˚C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25˚C	---	---	1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55˚C	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	26.5	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.4	2.8	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=15A	---	31.6	---	nC
Q_{gs}	Gate-Source Charge		---	8.6	---	
Q_{gd}	Gate-Drain Charge		---	11.7	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω $_D$=15A	---	9	---	ns
T_r	Rise Time		---	19	---	
$T_{d(off)}$	Turn-Off Delay Time		---	58	---	
T_f	Fall Time		---	15.2	---	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	3075	4000	pF
C_{oss}	Output Capacitance		---	400	530	
C_{rss}	Reverse Transfer Capacitance		---	315	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	80	A
I_{SM}	Pulsed Source Current[2,5]		---	---	132	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25˚C	---	---	1	V
t_{rr}	Reverse Recovery Time	IF=30A , dI/dt=100A/µs , $_J$=25˚C	---	18	---	nS
Q_{rr}	Reverse Recovery Charge		---	8	---	nC

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=53.8A
4.The power dissipation is limited by 175˚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.

RATING AND CHARACTERISTIC CURVES (60N03)

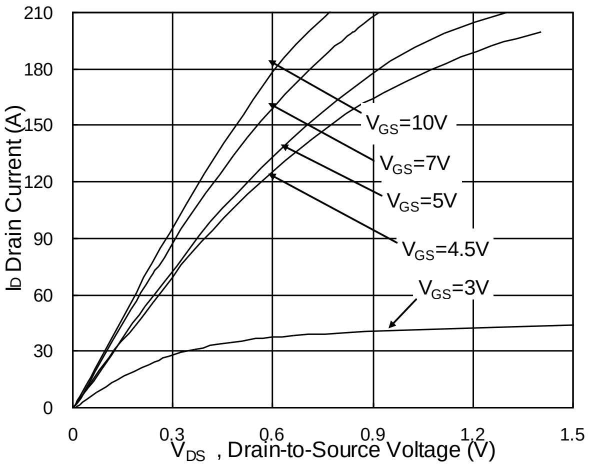


Fig.1 Typical Output Characteristics

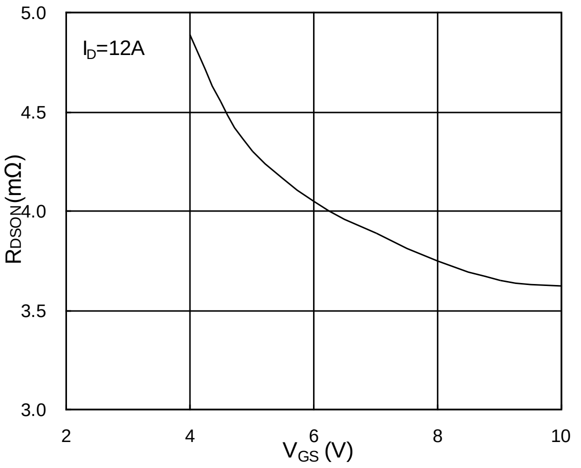


Fig.2 On-Resistance vs. G-S Voltage

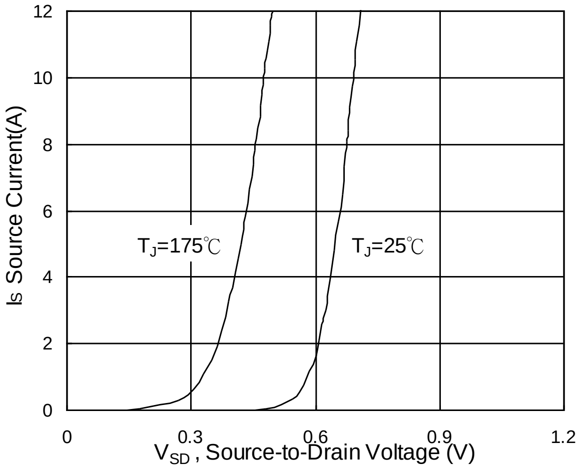


Fig.3 Forward Characteristics of Reverse

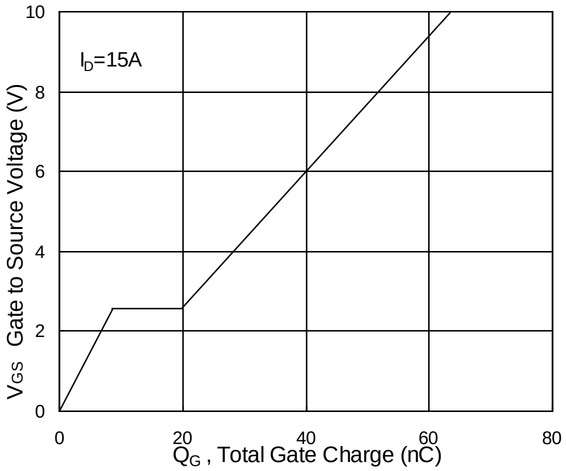


Fig.4 Gate-Charge Characteristics

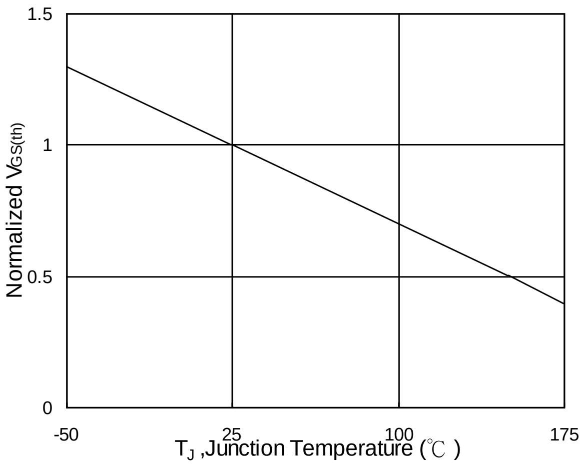


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

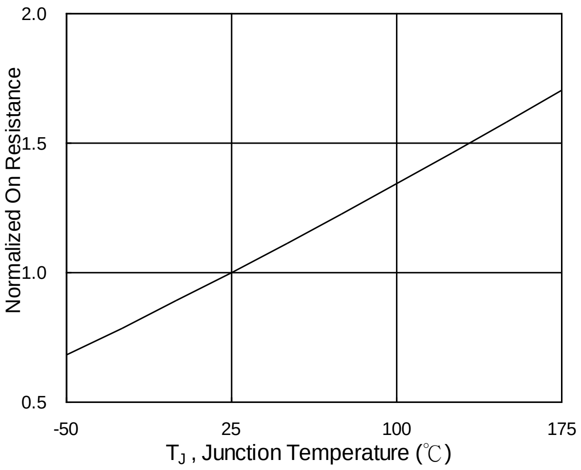


Fig.6 Normalized R_{DSON} vs. T_J

RATING AND CHARACTERISTIC CURVES (60N03)

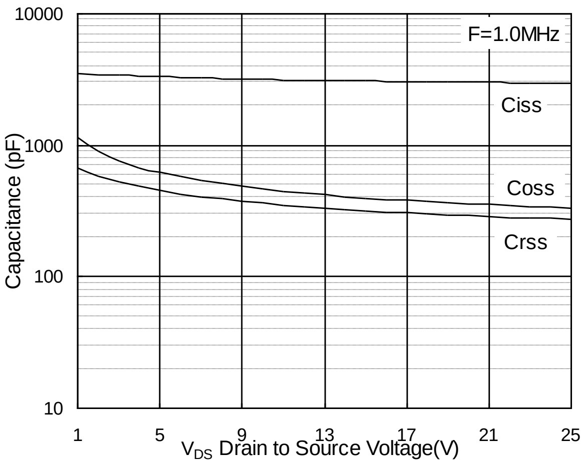


Fig.7 Capacitance

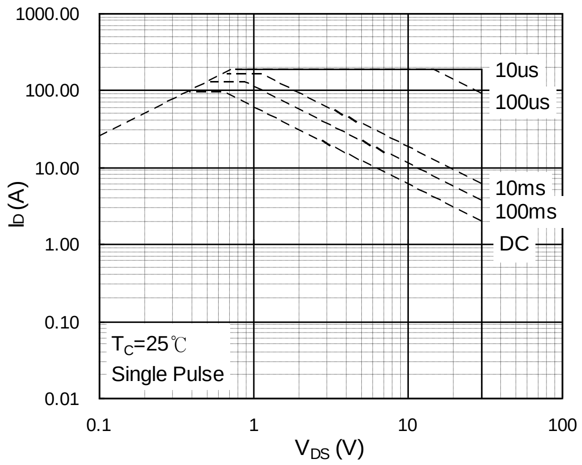


Fig.8 Safe Operating Area

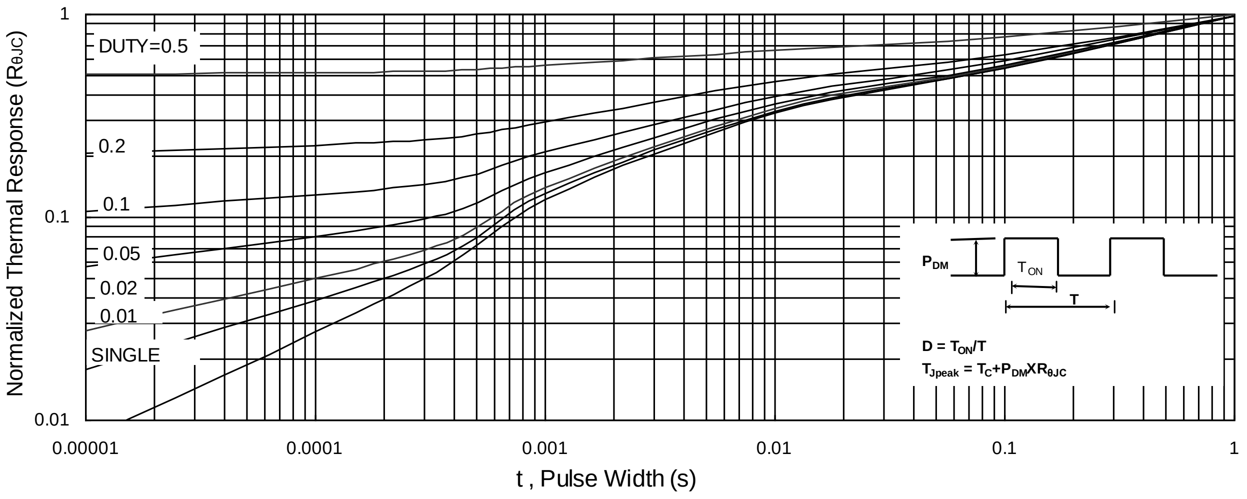


Fig.9 Normalized Maximum Transient Thermal Impedance

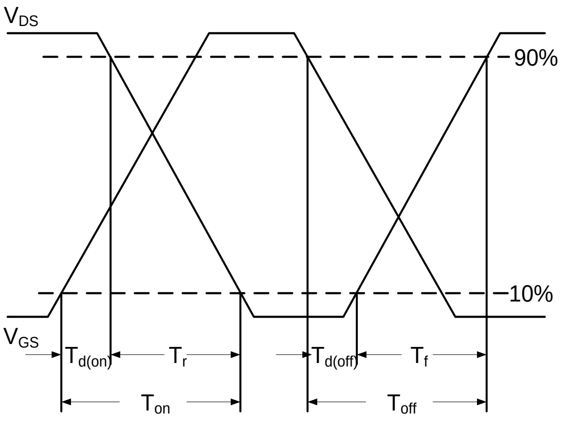


Fig.10 Switching Time Waveform

$$EAS= \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

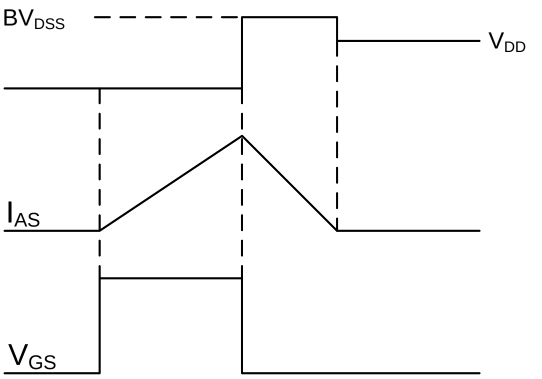


Fig.11 Unclamped Inductive Switching Waveform