Description

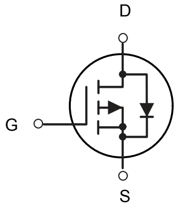
The 60P03D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

TO252-2L

General Features

V_{DS} = -30V I_D =-60 A

$R_{DS(ON)}$ < 13mΩ @ V_{GS}=10V



P-Channel MOSFET

Application

Battery protection

Load switch

Uninterruptible power supply

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	-30		V
V_{GS}	Gate-Source Voltage	±25		V
I_D@T_C=25˚C	Continuous Drain Current, V_{GS} @ -10V[1]	-60		A
I_D@T_C=100˚C	Continuous Drain Current, V_{GS} @ -10V[1]	-30		A
I_D@T_A=25˚C	Continuous Drain Current, V_{GS} @ -10V[1]	-15	-9.6	A
I_D@T_A=70˚C	Continuous Drain Current, V_{GS} @ -10V[1]	-12	-7.7	A
I_{DM}	Pulsed Drain Current[2]	-150		A
EAS	Single Pulse Avalanche Energy[3]	125		mJ
I_{AS}	Avalanche Current	-50		A
P_D@T_C=25˚C	Total Power Dissipation[4]	45		W
P_D@T_A=25˚C	Total Power Dissipation[4]	5	2.0	W
T_{STG}	Storage Temperature Range	-55 to 150		˚C
T_J	Operating Junction Temperature Range	-55 to 150		˚C
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	62		˚C/W
$R_{θJA}$	Thermal Resistance Junction-Ambient [1] (t ≤10s)	25		˚C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	2.8		˚C/W

Electrical Characteristics (T_J=25 ˚C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25˚C , I_D=-1mA	---	-0.0232	---	V/˚C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-30A	---	9.6	13	mΩ
		V_{GS}=-4.5V , I_D=-15A	---	13	18	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	---	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	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}=±25V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-30A	---	30	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	9	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-15A	---	22	---	nC
Q_{gs}	Gate-Source Charge		---	8.7	---	
Q_{gd}	Gate-Drain Charge		---	7.2	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3 I_D=-15A	---	8	---	ns
T_r	Rise Time		---	73.7	---	
$T_{d(off)}$	Turn-Off Delay Time		---	61.8	---	
T_f	Fall Time		---	24.4	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	2215	---	pF
C_{oss}	Output Capacitance		---	310	---	
C_{rss}	Reverse Transfer Capacitance		---	237	---	
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-45	A
I_{SM}	Pulsed Source Current[2,5]		---	---	-150	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25˚C	---	---	-1	V
t_{rr}	Reverse Recovery Time	I_F=-15A , dI/dt=100A/μs , T_J=25˚C	---	19	---	nS
Q_{rr}	Reverse Recovery Charge		---	9	---	nC

Note :

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}=-50A

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

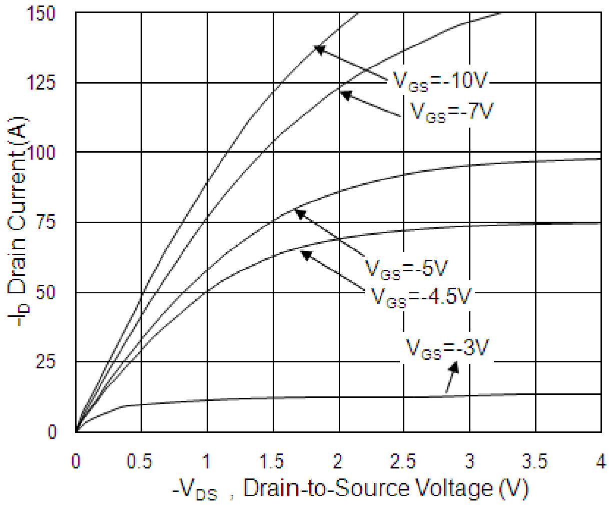


Fig.1 Typical Output Characteristics

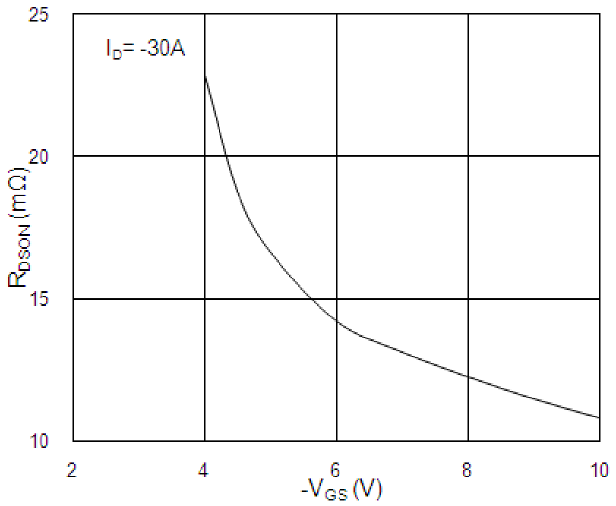


Fig.2 On-Resistance vs. G-S Voltage

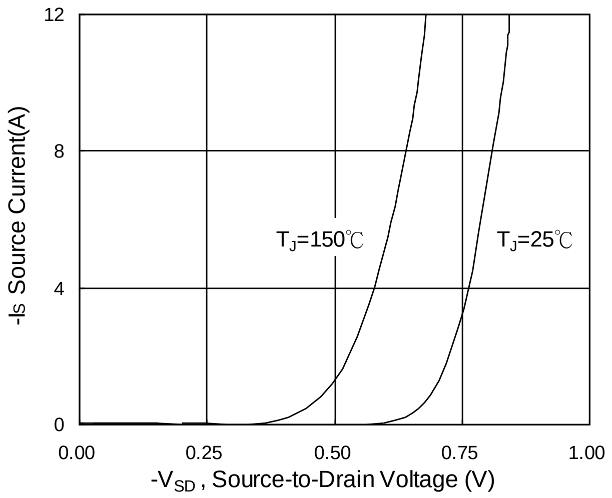


Fig.3 Forward Characteristics of Reverse

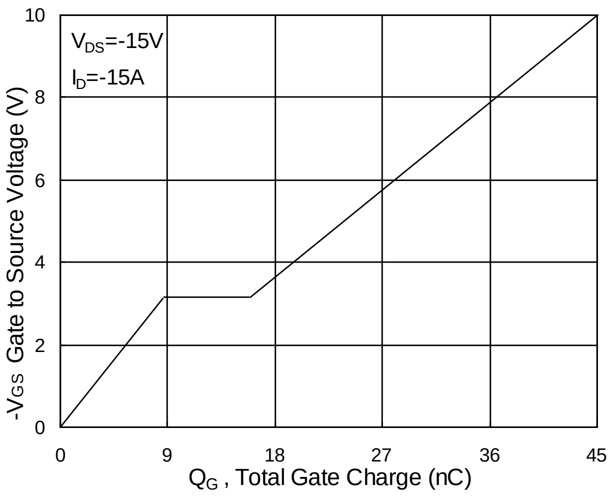


Fig.4 Gate-charge Characteristics

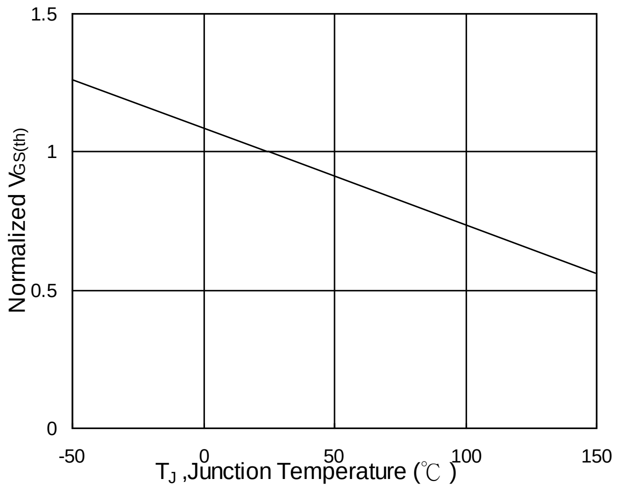


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

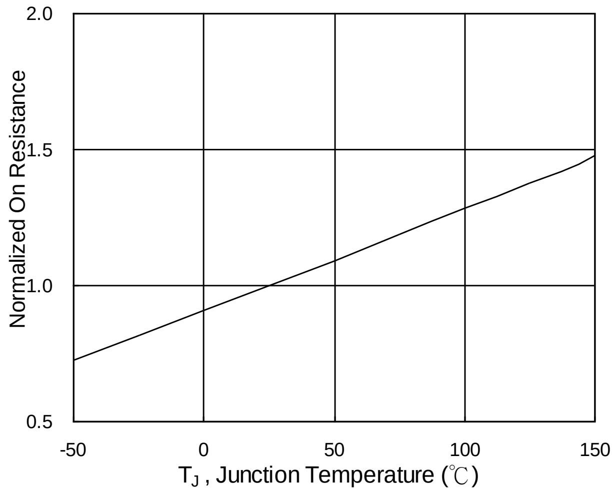


Fig.6 Normalized R_{DSON} vs. T_J

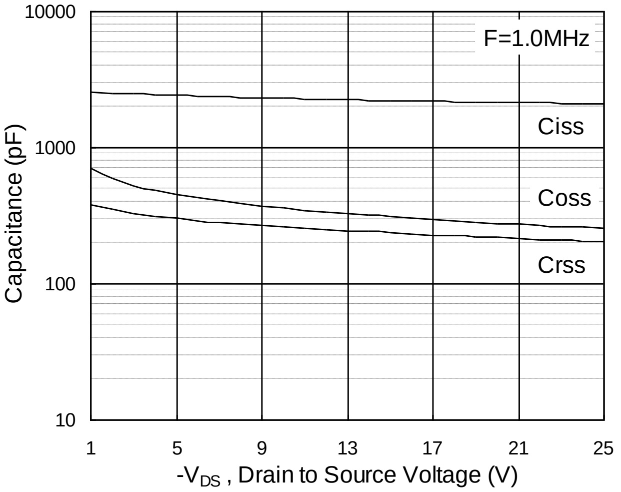


Fig.7 Capacitance

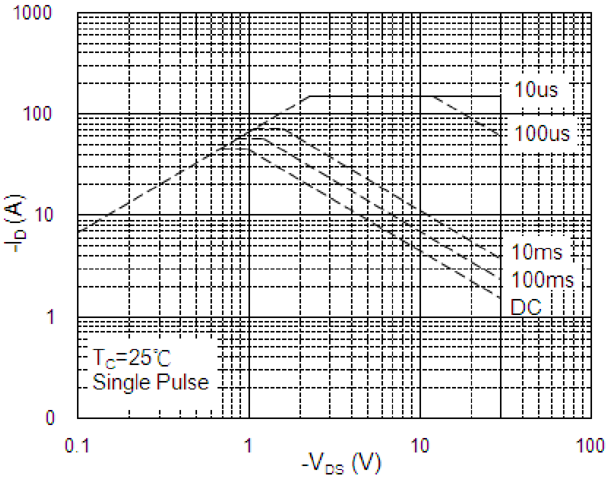


Fig.8 Safe Operating Area

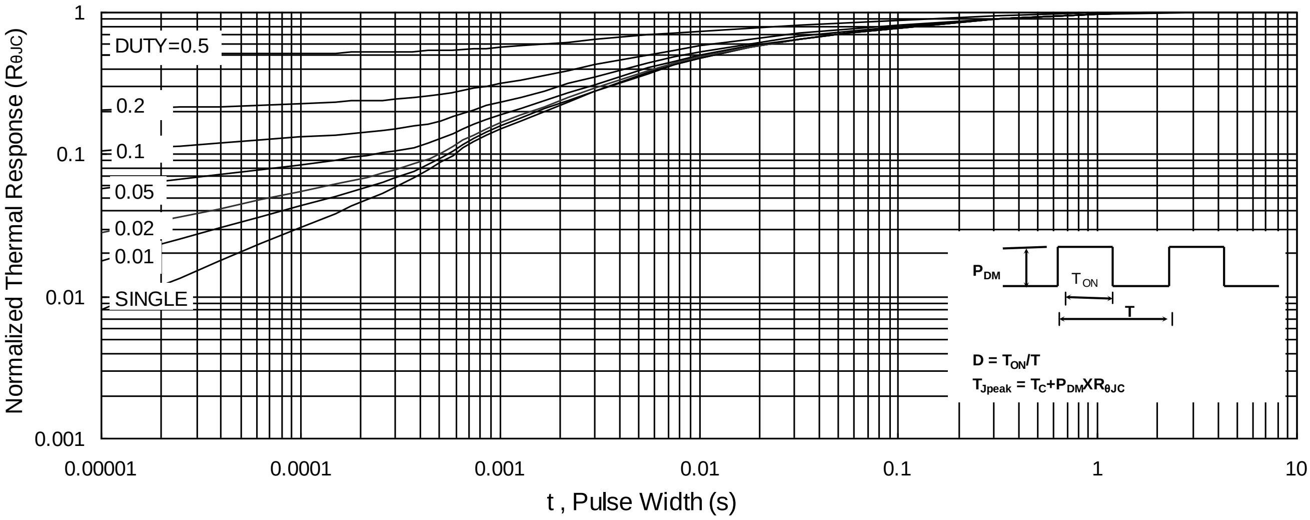


Fig.9 Normalized Maximum Transient Thermal Impedance

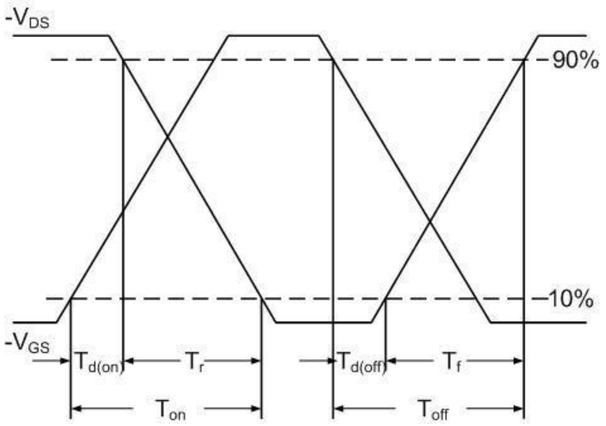


Fig.10 Switching Time Waveform

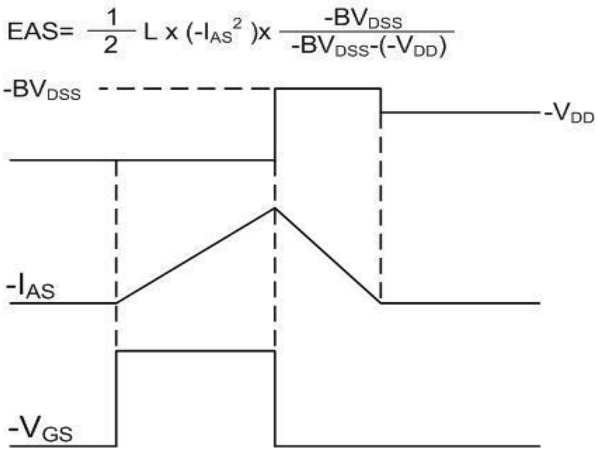
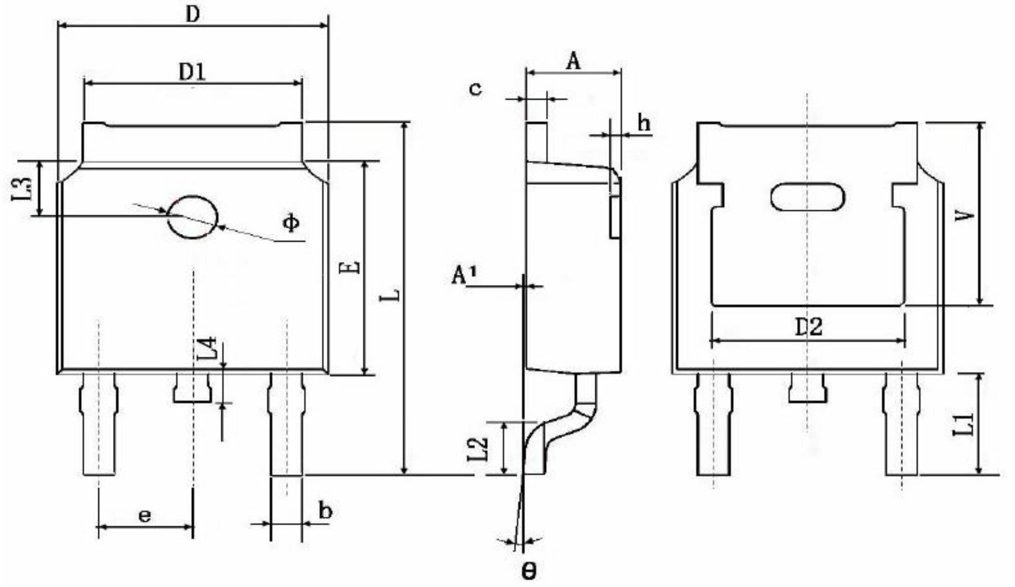


Fig.11 Unclamped Inductive Switching Waveform

TO252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	