

## Description

The 30P10 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

$V_{DS} = -100V$   $I_D = -30A$

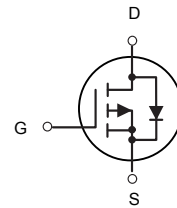
$R_{DS(ON)} < 95m\Omega$  @  $V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



P-Channel MOSFET

## Absolute Maximum Ratings ( $T_C=25^\circ C$ unless otherwise noted)

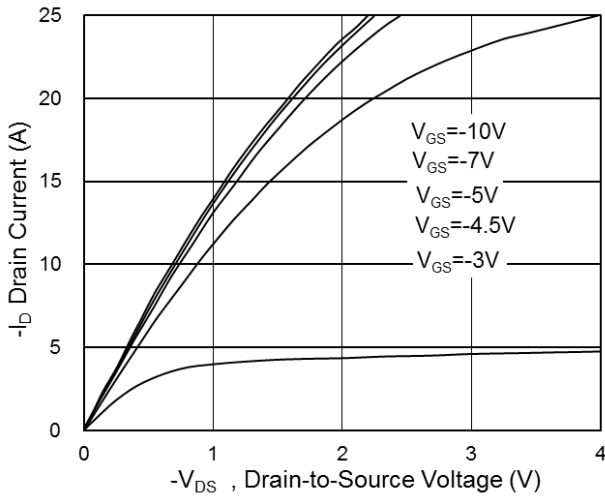
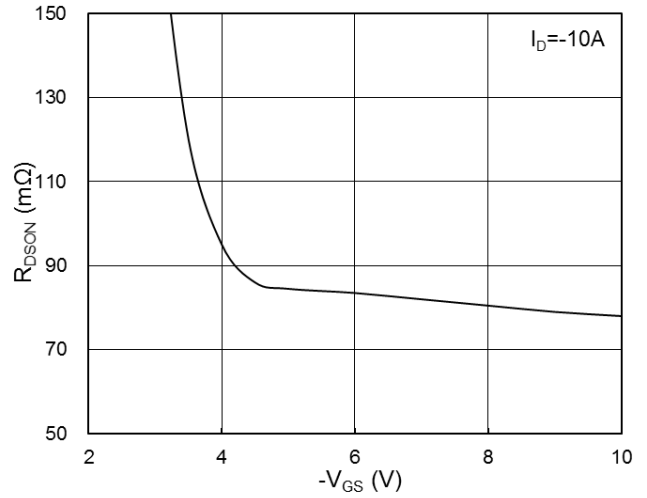
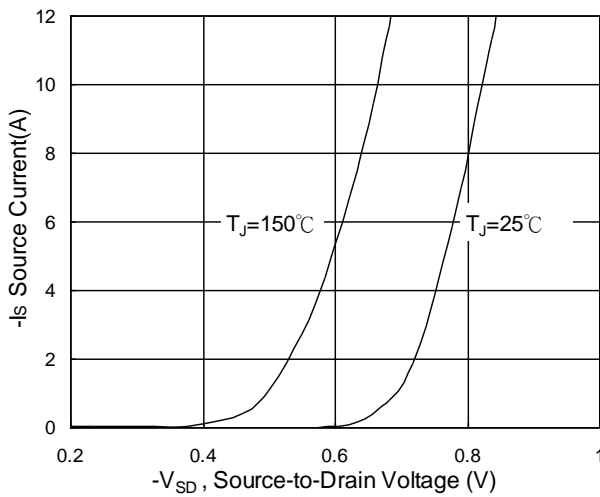
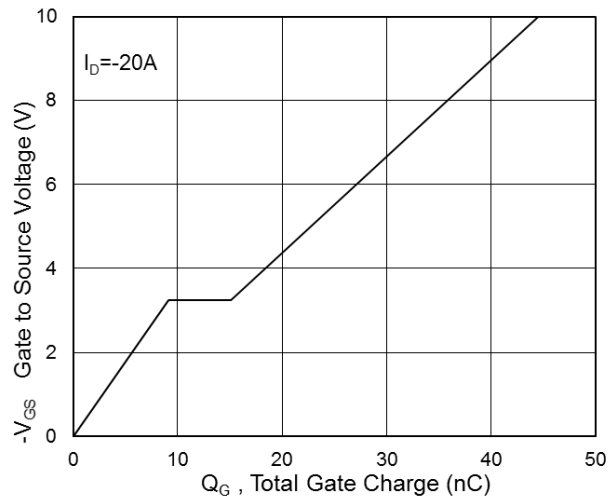
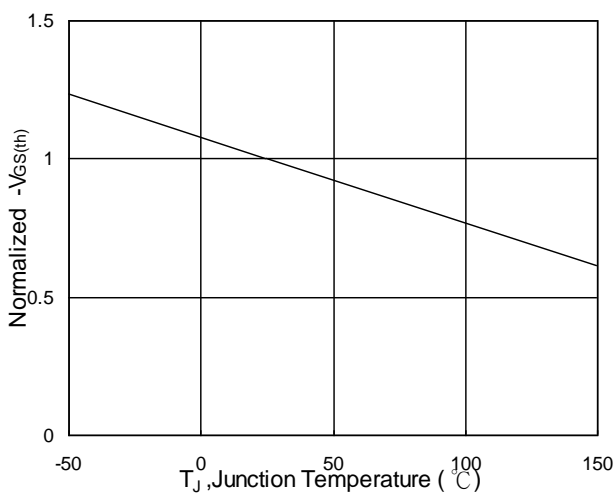
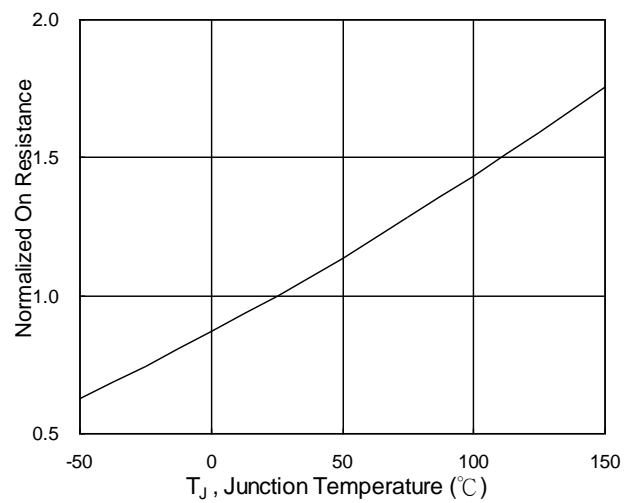
Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-30	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-15	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-75	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	157.2	mJ
$I_{AS}$	Avalanche Current	18.9	A
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	54	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	2.3	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-100	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V, I_D=-10A$	---	78	95	m $\Omega$
		$V_{GS}=-4.5V, I_D=-8A$	---	86	110	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.7	-2.5	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-100V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-50	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=-10V, I_D=-10A$	---	24	---	S
$Q_g$	Total Gate Charge	$V_{DS}=-50V, V_{GS}=-10V, I_D=-20A$	---	44.5	---	nC
$Q_{gs}$	Gate-Source Charge		---	9.13	---	
$Q_{gd}$	Gate-Drain Charge		---	5.93	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-50V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-10A$	---	12	---	ns
$T_r$	Rise Time		---	27.4	---	
$T_{d(off)}$	Turn-Off Delay Time		---	79	---	
$T_f$	Fall Time		---	53.6	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, f=1\text{MHz}$	---	3029	---	pF
$C_{oss}$	Output Capacitance		---	129	---	
$C_{rss}$	Reverse Transfer Capacitance		---	76	---	
$I_S$	Continuous Source Current <sup>1,5</sup>	$V_G=V_D=0V, \text{Force Current}$	---	---	-18	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=-8A, di/dt=-100A/\mu s,$	---	38.7	---	nS
$Q_{rr}$	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	22.4	---	nC

Note :

- The data tested by surface mounted on a 1 inch FR-4 board with 2OZ copper.
- The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating . The test condition is  $V_{DD}=-25V, V_{GS}=-10V, L=0.88mH, I_{AS}=-18.9A$
- The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
- 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 Typical S-D Diode Forward Voltage**

**Fig.4 Gate-Charge Characteristics**

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

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

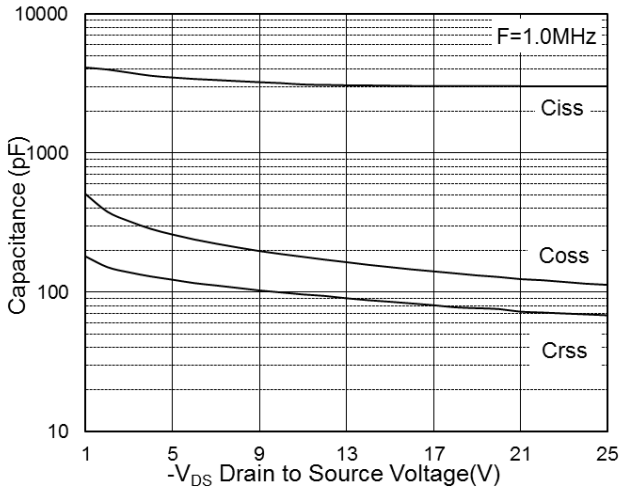


Fig.7 Capacitance

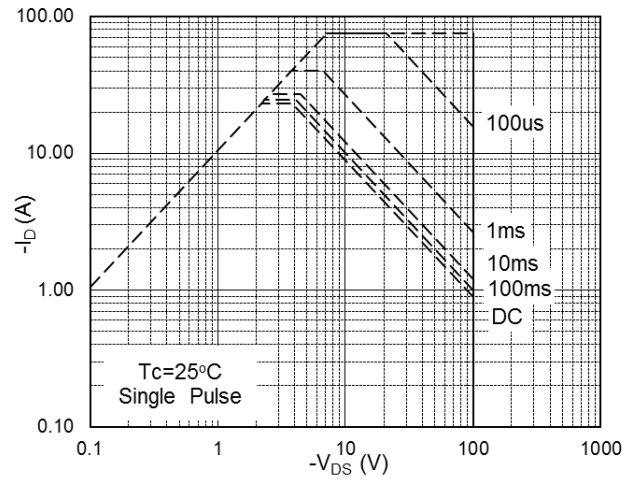


Fig.8 Safe Operating Area

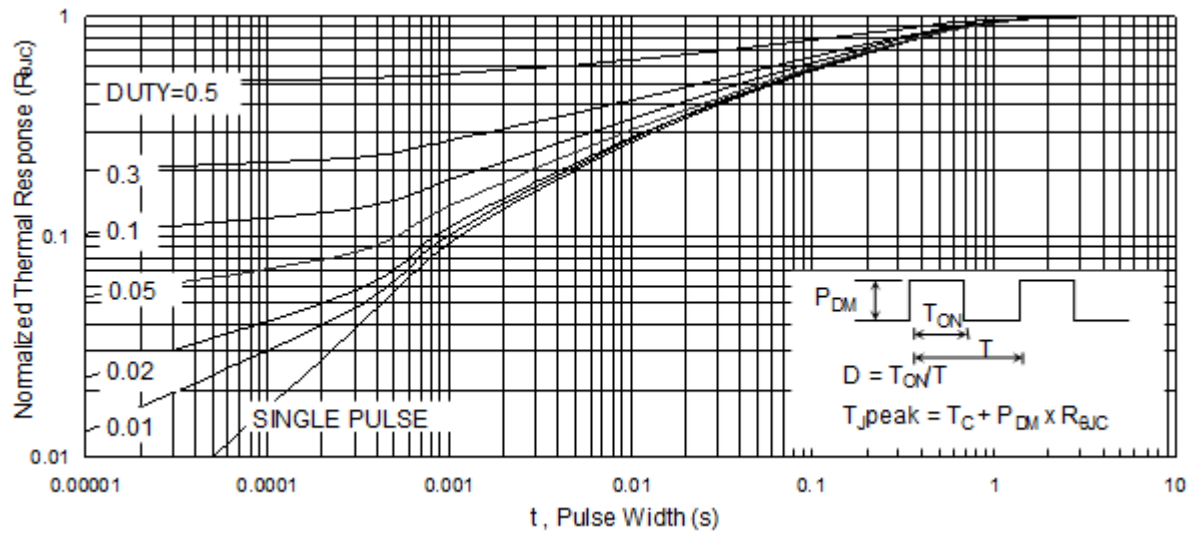


Fig.9 Normalized Maximum Transient Thermal Impedance

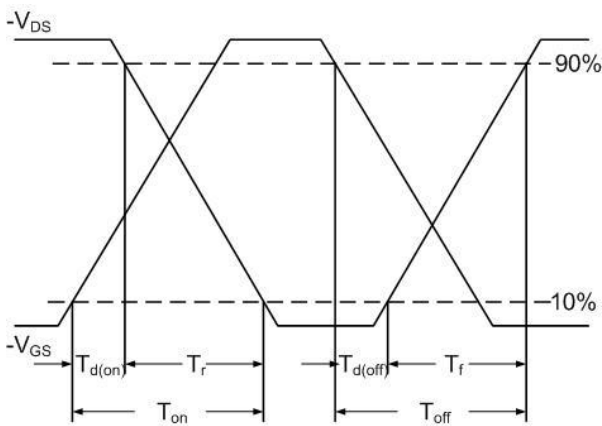


Fig.10 Switching Time Waveform

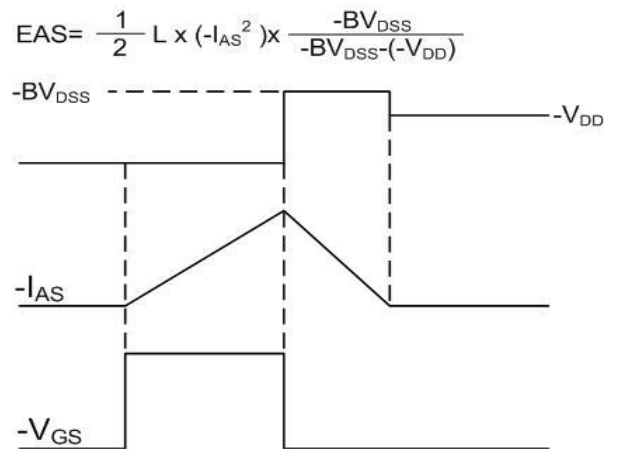
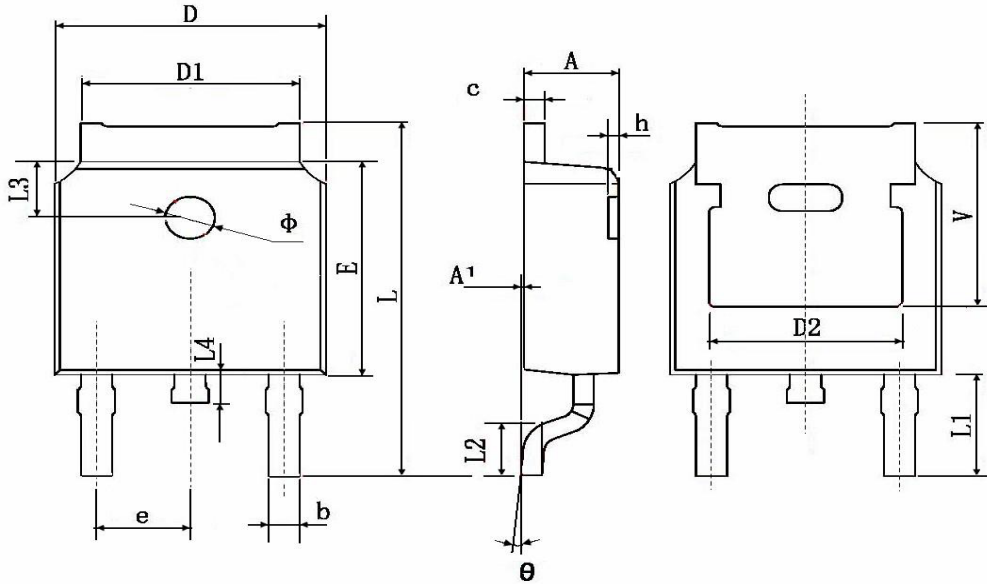


Fig.11 Unclamped Inductive Waveform

**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.	