

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



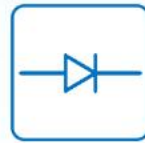
TVS



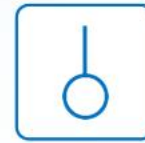
MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

▶ Domestic	Part Number	IRF9393
▶ Overseas	Part Number	IRF9393
▶ Equivalent	Part Number	IRF9393

EV is the abbreviation of name EVVO

**-30V P-Channel Enhancement Mode MOSFET**

**Description**

The IRF9393 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

**SOP-8L Pin Configuration**

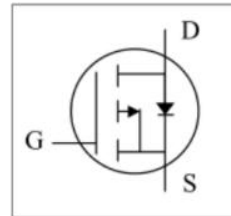


**General Features**

- $V_{DS} = 30V$   $I_D = 15A$
- $R_{DS(ON)} < 15m\Omega @ V_{GS}=10V$
- $R_{DS(ON)} < 26m\Omega @ V_{GS}=4.5V$

**Application**

- Battery protection
- Load switch
- Uninterruptible power supply



**Absolute Maximum Ratings (Tc=25°C unless otherwise noted )**

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	+20	V
$I_D@T_A=25^\circ C$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	-15	A
$I_D@T_A=70^\circ C$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	-11	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-40	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	2.5	W
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
$R_{thj-a}$	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	50	°C/W

**-30V P-Channel Enhancement Mode MOSFET**
**Electrical Characteristics@T<sub>j</sub>=25° C(unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	-	12.5	15	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A	-	22	26	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1.2	-1.6	-2.0	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-10A	-	22	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	-	-	-1	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =-6A	-	28	45	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-15V	-	7	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =-4.5V	-	11	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =-15V	-	13	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =-1A	-	10	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	80	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =-10V	-	37	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V V <sub>DS</sub> =-	-	2940	4700	pF
C <sub>oss</sub>	Output Capacitance	15V f=1.0MHz	-	290	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	210	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	6.2	12.4	Ω
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =-2.1A, V <sub>GS</sub> =0V	-	-	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =-10A, V <sub>GS</sub> =0V, dI/dt=100A/μs	-	19	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	6	-	nC

**Notes:**

1.Pulse width limited by Max. junction temperature.

2.Pulse test

 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤ 10s ; 125 °C/W when mounted on Min. copper pad.



-30V P-Channel Enhancement Mode MOSFET

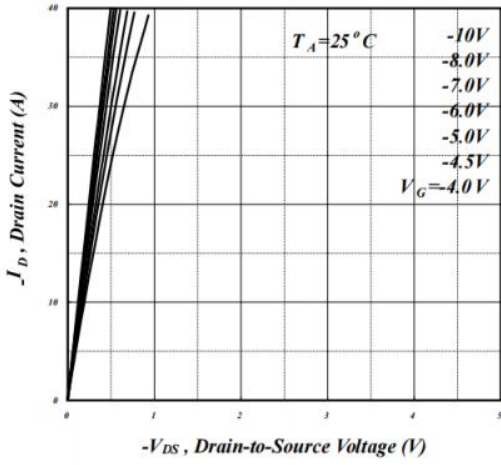


Fig 1. Typical Output Characteristics

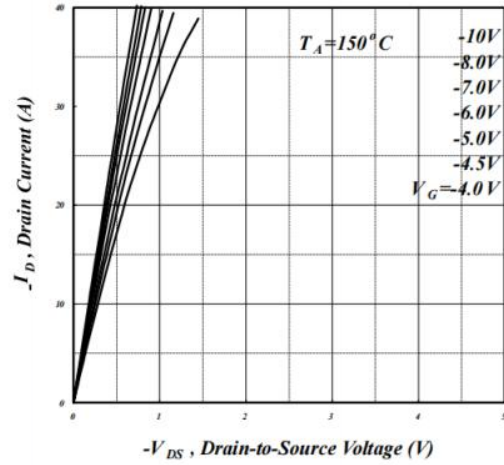


Fig 2. Typical Output Characteristics

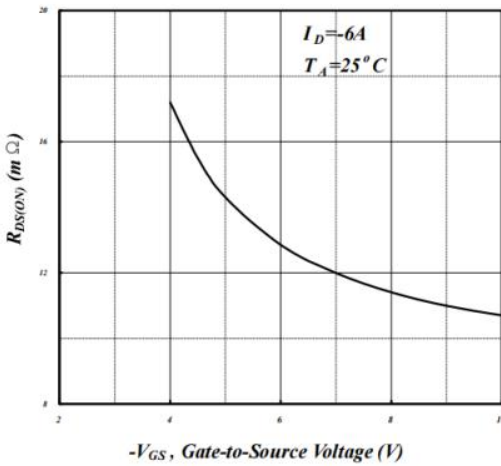


Fig 3. On-Resistance v.s. Gate Voltage

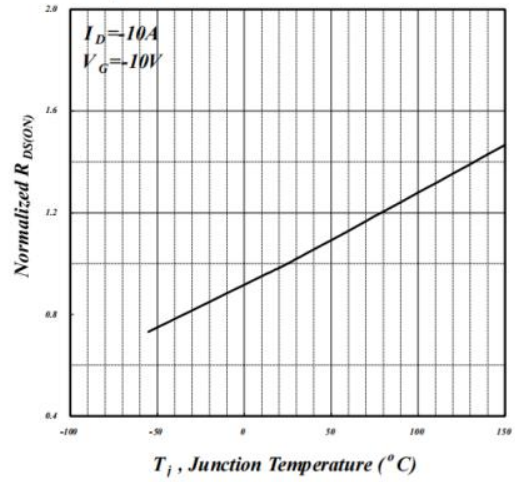
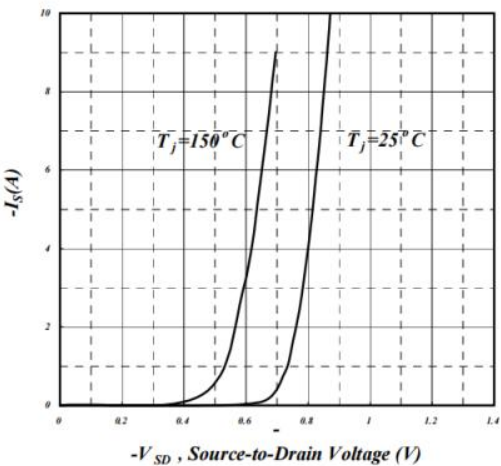


Fig 4. Normalized On-Resistance v.s. Junction Temperature



Reverse Diode

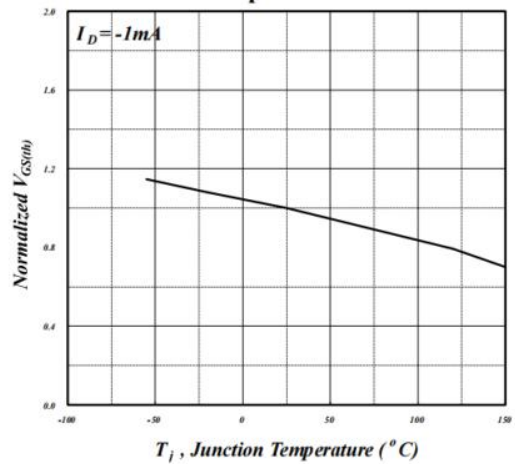


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

-30V P-Channel Enhancement Mode MOSFET

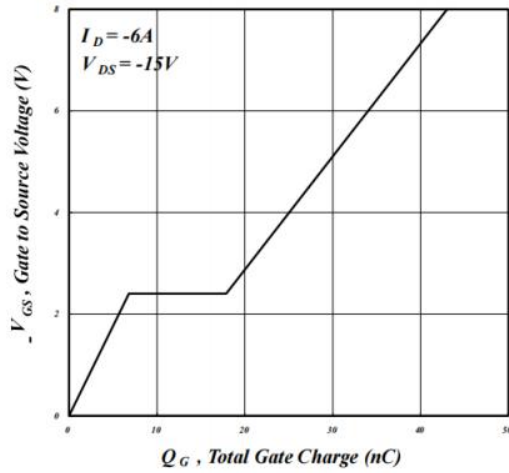


Fig 7. Gate Charge Characteristics

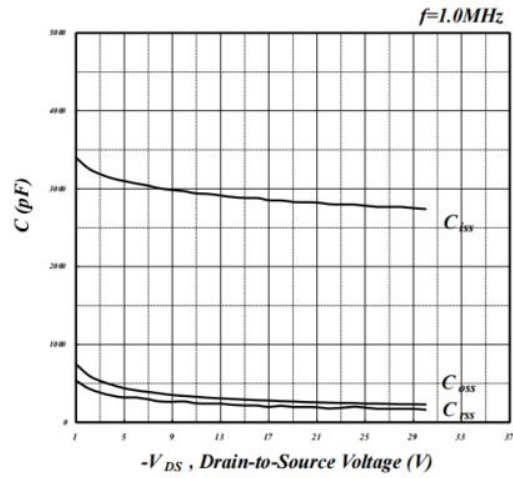


Fig 8. Typical Capacitance Characteristics

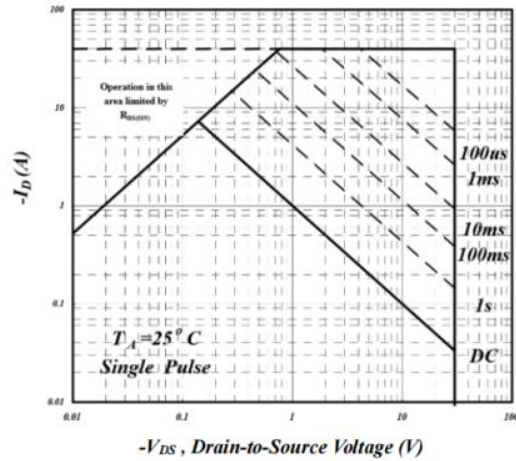


Fig 9. Maximum Safe Operating Area

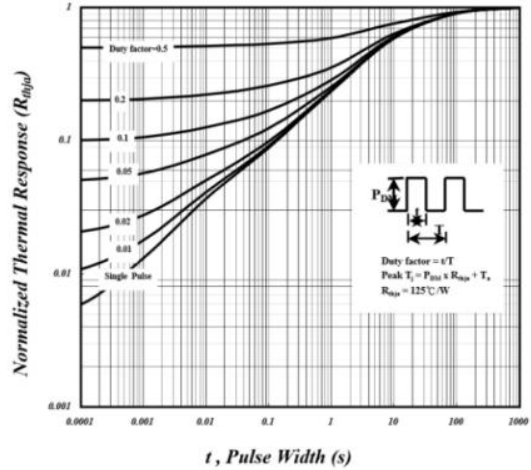


Fig 10. Effective Transient Thermal Impedance

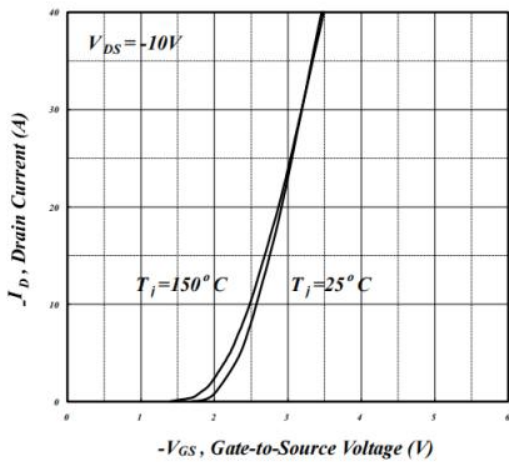


Fig 11. Transfer Characteristics

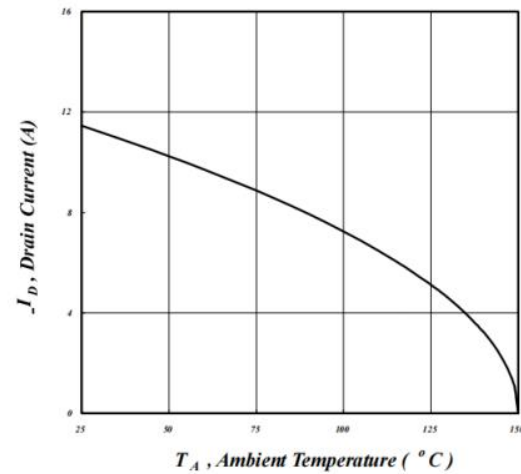


Fig 12. Drain Current v.s. Ambient Temperature

-30V P-Channel Enhancement Mode MOSFET

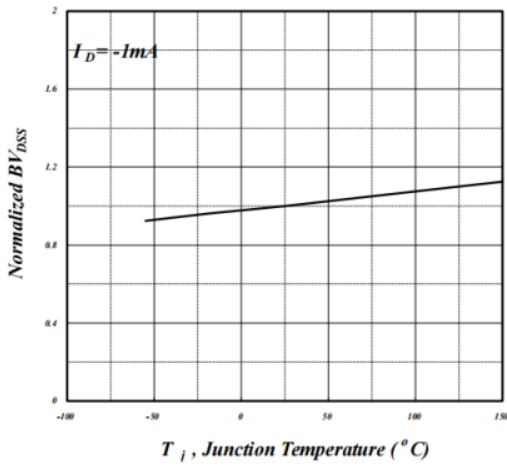


Fig 13. Normalized  $BV_{DSS}$  v.s. Junction Temperature

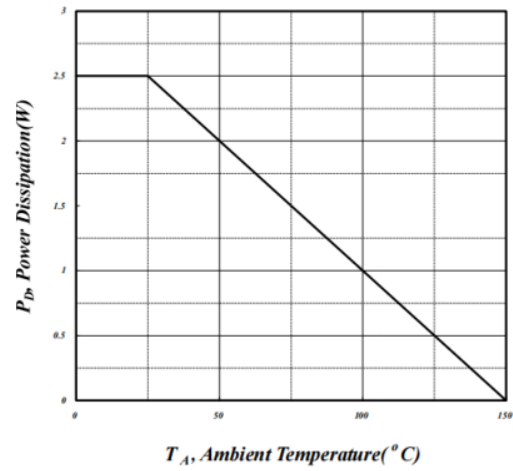


Fig 14. Total Power Dissipation

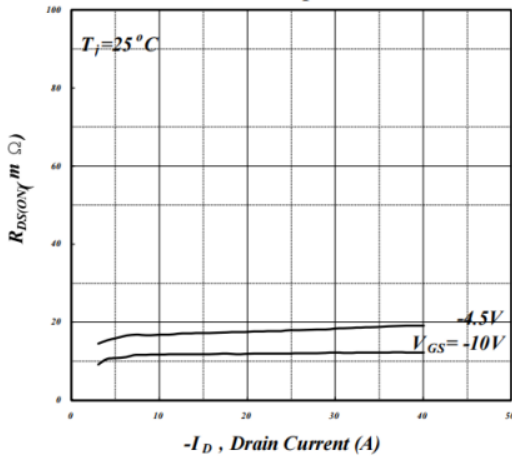
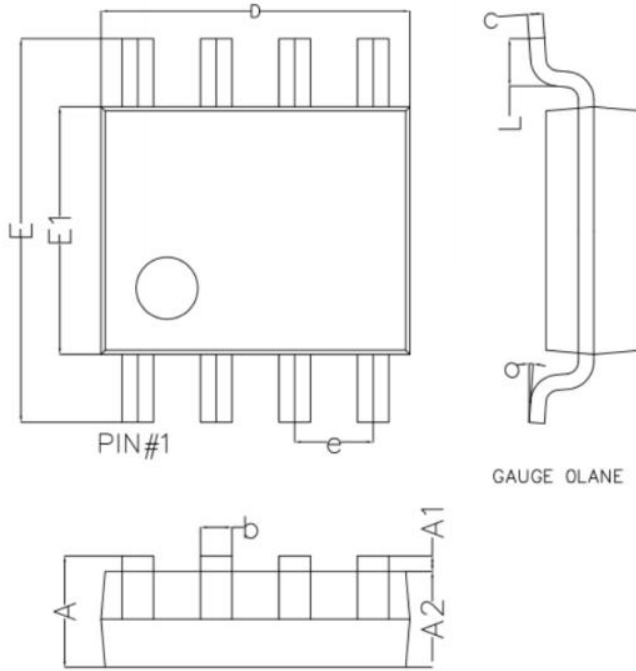


Fig 15. Typ. Drain-Source on State Resistance

**-30V P-Channel Enhancement Mode MOSFET**

**PACK SOP-8**

SOP8 Package outline



Symbol	Dim in mm		
	Min	Nor	Max
A	1.350	1.550	1.750
A1	0.100	0.175	0.250
A2	1.350	1.450	1.550
b	0.330	0.420	0.510
c	0.170	0.210	0.250
D	4.800	4.900	5.000
e	1.270 (BSC)		
E	5.800	6.000	6.200
E1	3.800	3.900	4.000
L	0.400	0.835	1.2700
o	0°	4°	8°

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