

EVVOSEMI[®]

THINK CHANGE DO



ESD



TVS



MOS



LDO



Diode



Sensor



DC-DC

Product Specification

▶ Domestic	Part Number	IRF7503
▶ Overseas	Part Number	IRF7503
▶ Equivalent	Part Number	IRF7503

EV is the abbreviation of name EVVO

30V N+N-Channel Enhancement Mode MOSFET

General Description

The IRF7503 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the small power switching and load switch applications. The meet the RoHS and Product requirement with full function reliability approved.

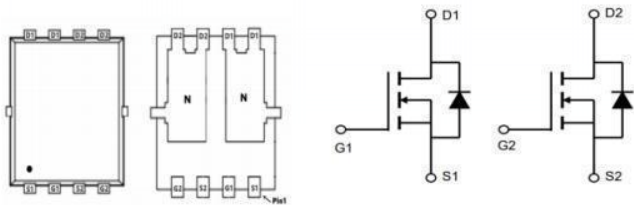
Application

- Battery protection
- Load switch
- Uninterruptible power supply

General Features

- $V_{DS} = 30V$ $I_D = 5.8A$
- $R_{DS(ON)} < 28m\Omega$ @ $V_{GS} = 10V$
- $R_{DS(ON)} < 40m\Omega$ @ $V_{GS} = 4.5V$

SOP-8L Pin Configuration



Absolute Maximum Ratings $T_c=25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^{\circ}C$)	5.8	A
	Drain Current – Continuous ($T_c=100^{\circ}C$)	4.8	A
I_{DM}	Drain Current – Pulsed ¹	30	A
EAS	Single Pulse Avalanche Energy ²	14	mJ
IAS	Single Pulse Avalanched Current ²	17	A
P_D	Power Dissipation ($T_c=25^{\circ}C$)	2.1	W
	Power Dissipation – Derate above $25^{\circ}C$	0.017	W/ $^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$

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Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	60	$^{\circ}\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	33	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.04	---	$\text{V}/^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=24V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=10V, I_D=5A$	---	19	28	m Ω
		$V_{GS}=4.5V, I_D=3A$	---	26	40	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.5	2.4	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4	---	$\text{mV}/^{\circ}\text{C}$
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=6A$	---	13	---	S

Q_g	Total Gate Charge ^{3, 4}	$V_{DS}=15V, V_{GS}=4.5V, I_D=5A$	---	4.1	8	nC
Q_{gs}	Gate-Source Charge ^{3, 4}		---	1	2	
Q_{gd}	Gate-Drain Charge ^{3, 4}		---	2.1	4	
$T_{d(on)}$	Turn-On Delay Time ^{3, 4}	$V_{DD}=15V, V_{GS}=10V, R_G=6\Omega, I_D=1A$	---	2.6	5	ns
T_r	Rise Time ^{3, 4}		---	7.2	14	
$T_{d(off)}$	Turn-Off Delay Time ^{3, 4}		---	15.8	30	
T_f	Fall Time ^{3, 4}		---	4.6	9	
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$	---	345	500	pF
C_{oss}	Output Capacitance		---	55	80	
C_{rss}	Reverse Transfer Capacitance		---	32	55	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	---	3.2	6.4	Ω

I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	7.5	A
I_{SM}	Pulsed Source Current ³		---	---	30	A
V_{SD}	Diode Forward Voltage ³	$V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$	---	---	1	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=1A, di/dt=100\text{A}/\mu\text{s}$	---	---	---	ns
Q_{rr}	Reverse Recovery Charge	$T_J=25^{\circ}\text{C}$	---	---	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width $DD=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=17A, R_{GS}\leq 25\ 300\mu\text{s}$, duty cycle, Starting $T_J=25\leq^{\circ}\text{C}$. 2%.
3. Essentially independent of operating temperature.

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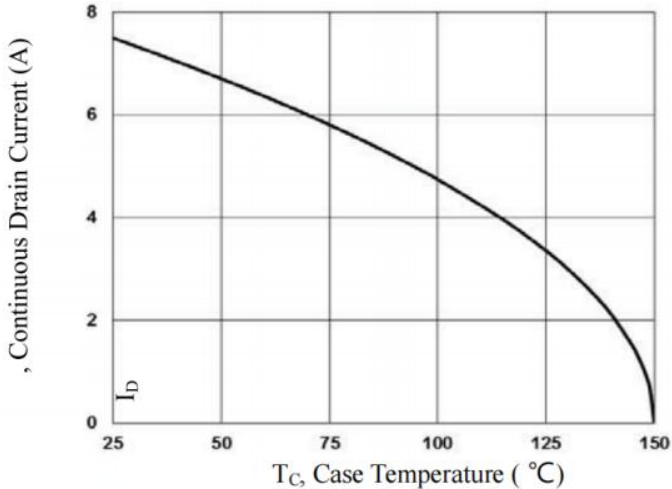


Fig.1 Continuous Drain Current vs. T_C

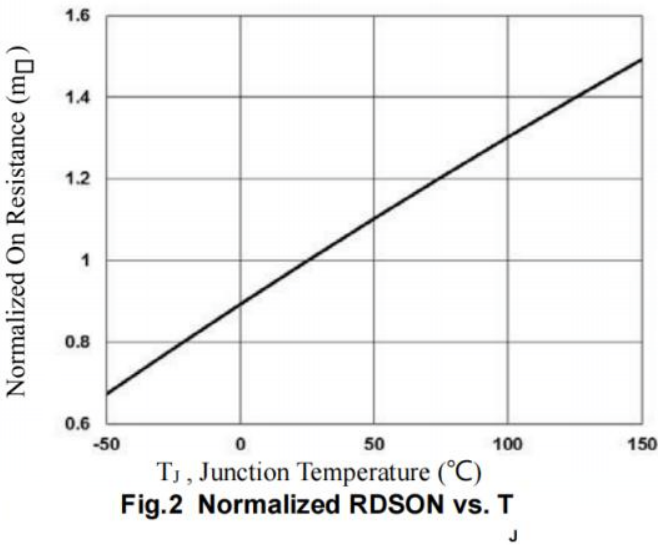


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

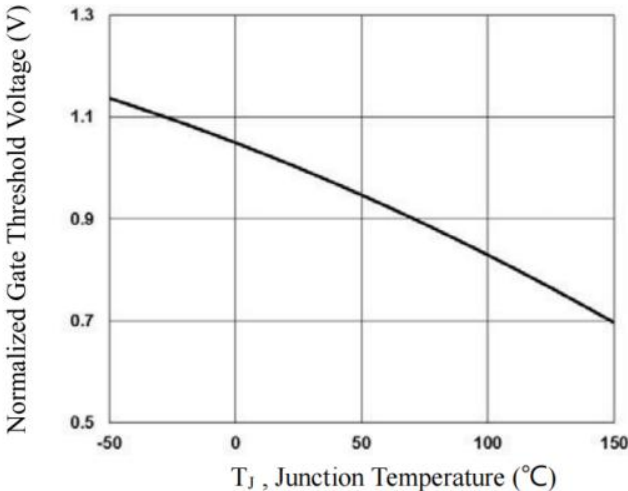


Fig.3 Normalized V_{th} vs. T_J

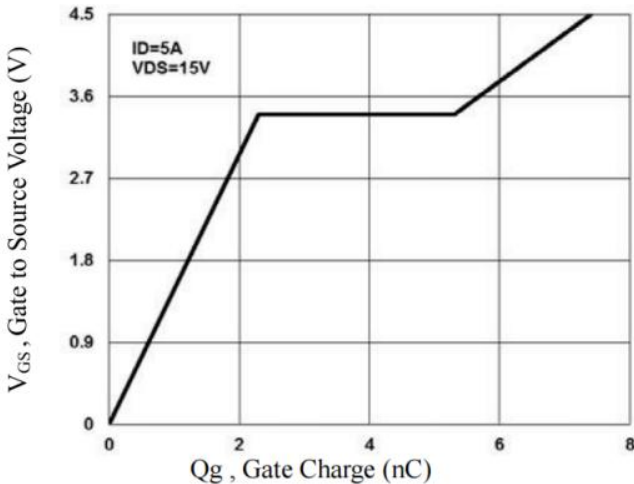


Fig.4 Gate Charge Waveform

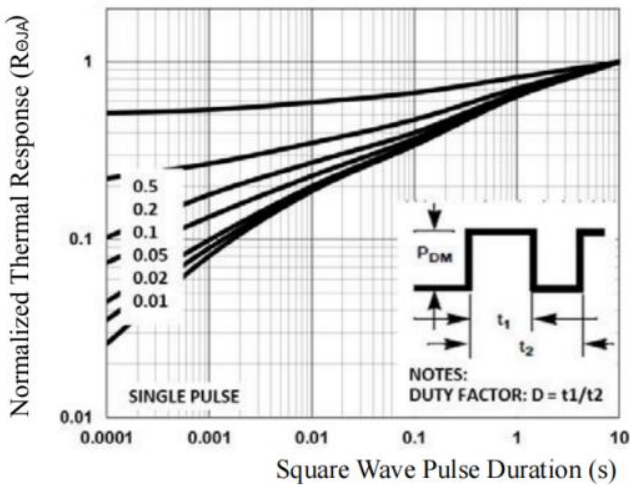


Fig.5 Normalized Transient Response

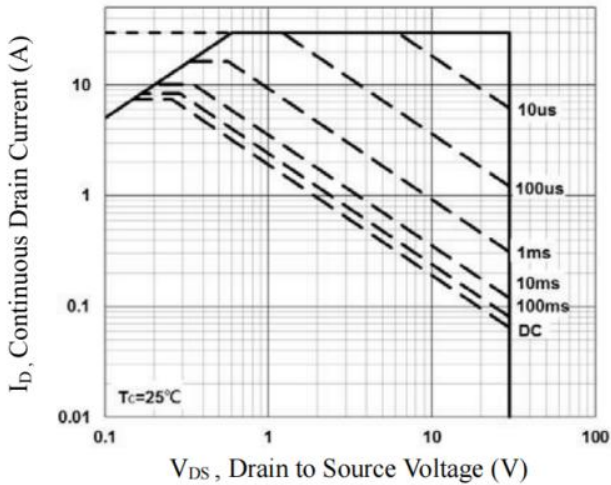


Fig.6 Maximum Safe Operation Area

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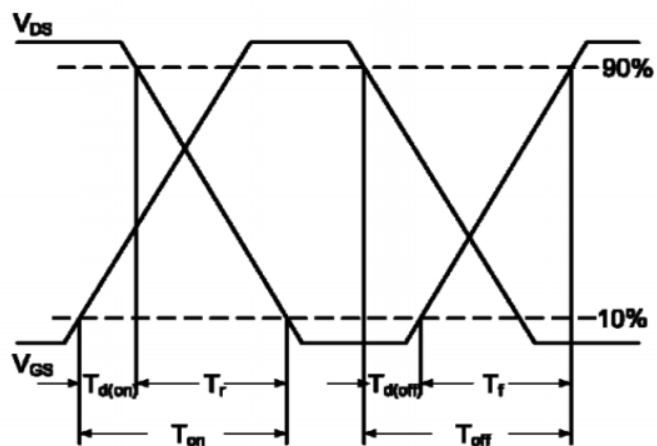


Fig.7 Switching Time Waveform

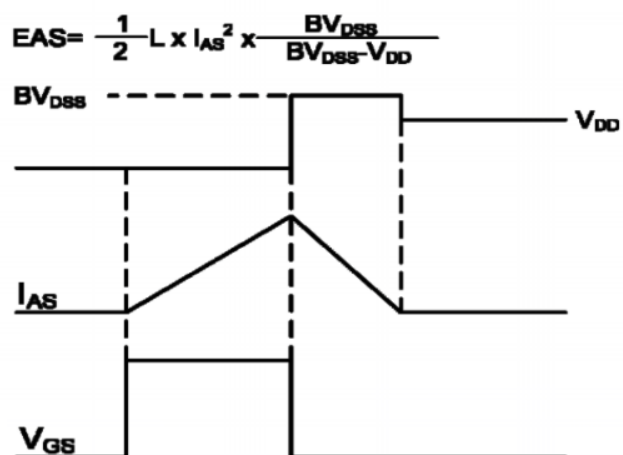


Fig.8 EAS waveform

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

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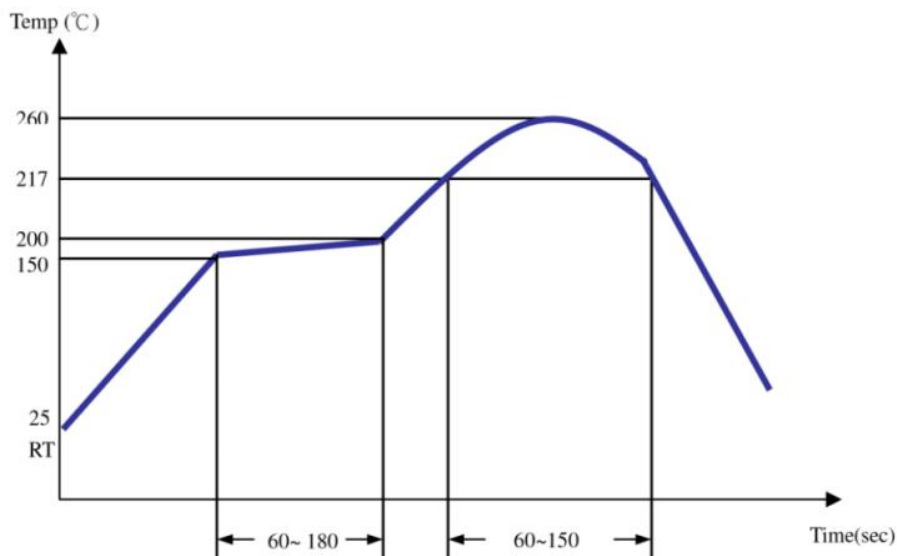
Reflow Soldering

The choice of heating method may be influenced by plastic QFP package). If infrared or vapor phase heating is used and the package is not absolutely dry (less than 0.1% moisture content by weight), vaporization of the small amount of moisture in them can cause cracking of the plastic body. Preheating is necessary to dry the paste and evaporate the binding agent. Preheating duration: 45 minutes at 45 °C.

Reflow soldering requires solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the printed-circuit board by screen printing, stenciling or pressure-syringe dispensing before package placement. Several methods exist for reflowing; for example, convection or convection/infrared heating in a conveyor type oven. Throughput times (preheating, soldering and cooling) vary between 100 and 200 seconds depending on heating method.

Typical reflow peak temperatures range from 215 to 270 °C depending on solder paste material. The top-surface temperature of the packages should preferable be kept below 245 °C for thick/large packages (packages with a thickness 2.5 mm or with a volume 350 mm³ so called thick/large packages). The top-surface temperature of the packages should preferable be kept below 260 °C for thin/small packages (packages with a thickness < 2.5 mm and a volume < 350 mm³ so called thin/small packages).

Stage	Condition	Duration
1'st Ram Up Rate	max3.0+/-2 /sec	-
Preheat	150 ~200	60~180 sec
2'nd Ram Up	max3.0+/-2 /sec	-
Solder Joint	217 above	60~150 sec
Peak Temp	260 +0/-5	20~40 sec
Ram Down rate	6 /sec max	-



Wave Soldering:

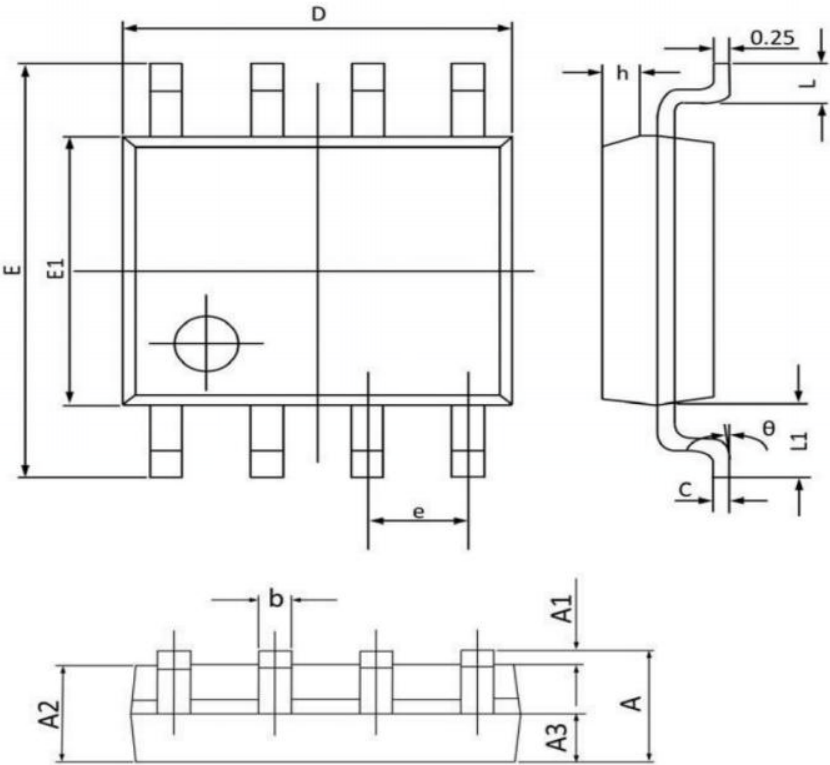
Conventional single wave soldering is not recommended for surface mount devices (SMDs) or printed-circuit boards with a high component density, as solder bridging and non-wetting can present major problems.

Manual Soldering:

Fix the component by first soldering two diagonally-opposite end leads. Use a low voltage (24 V or less) soldering iron applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 °C. When using a dedicated tool, all other leads can be soldered in one operation within 2 to 5 seconds between 270 and 320 °C.

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SOP8 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.068
A1	0.100	0.250	0.004	0.009
A2	1.300	1.500	0.052	0.059
A3	0.600	0.700	0.024	0.027
b	0.390	0.480	0.016	0.018
c	0.210	0.260	0.009	0.010
D	4.700	5.100	0.186	0.200
E	5.800	6.200	0.229	0.244
E1	3.700	4.100	0.146	0.161
e	1.270(BSC)		0.050(BSC)	
h	0.250	0.500	0.010	0.019
L	0.500	0.800	0.019	0.031
L1	1.050(BSC)		0.041(BSC)	
θ	0°	8°	0°	8°

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