

EVVOSEMI[®]

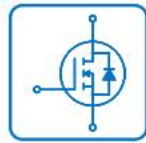
THINK CHANGE DO



ESD



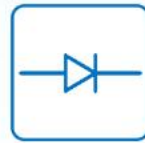
TVS



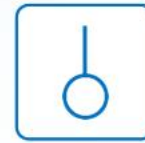
MOS



LDO



Diode



Sensor



DC-DC

Product Specification

▶ Domestic	Part Number	IRF1404Z
▶ Overseas	Part Number	IRF1404Z
▶ Equivalent	Part Number	IRF1404Z

EV is the abbreviation of name EVVO

Description

40V /180A Power MOSFET

Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$

Pb-free lead plating; RoHS compliant

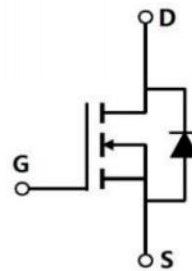
TO-220-3L Pin Configuration



40V N-Channel Enhancement Mode MOSFET

General Features

V_{DS}	40	V
$R_{DS(on),TYP@V_{GS}=10V}$	2.6	mΩ
$R_{DS(on),TYP@V_{GS}=4.5}$	3.5	mΩ
I_D	180	A



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	40	V
Gate source voltage	V_{GS}	± 20	V
Continuous drain current ¹⁾	I_D	180	A
Pulsed drain current ²⁾	$I_{D,pulse}$	390	A
Power dissipation ³⁾	P_D	140	W
Single pulsed avalanche energy ⁴⁾	E_{AS}	200	mJ
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^\circ\text{C}$
Thermal resistance, junction-case	$R_{\theta JC}$	0.89	$^\circ\text{C/W}$
Thermal resistance, junction-ambient ⁵⁾	$R_{\theta JA}$	62	$^\circ\text{C/W}$

40V N-Channel Enhancement Mode MOSFET
Electrical Characteristics (T_J=25°C, unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV _{DSS}	40			V	V _{GS} =0 V, I _D =250 μA
Gate threshold voltage	V _{GS(th)}	1.0		2.5	V	V _{DS} =V _{GS} , I _D =250 μA
Drain-source on-state resistance	R _{DS(ON)}		2.6	2.8	mΩ	V _{GS} =10 V, I _D =55 A
Drain-source on-state resistance	R _{DS(ON)}		3.0	3.5	mΩ	V _{GS} =4.5 V, I _D =55 A
Gate-source leakage current	I _{GSS}			100	nA	V _{GS} =20 V
				-100		V _{GS} =-20 V
Drain-source leakage current	I _{DSS}			1	μA	V _{DS} =40 V, V _{GS} =0 V
Input capacitance	C _{iss}		6587.4		pF	V _{GS} =0 V, V _{DS} =20 V, f=100 kHz
Output capacitance	C _{oss}		2537.3		pF	
Reverse transfer capacitance	C _{rss}		178.8		pF	
Turn-on delay time	t _{d(on)}		26.6		ns	V _{GS} =10 V, V _{DS} =20 V, R _G =2 Ω, I _D =20 A
Rise time	t _r		9.3		ns	
Turn-off delay time	t _{d(off)}		96		ns	
Fall time	t _f		39.3		ns	
Total gate charge	Q _g		96.8		nC	I _D =20 A, V _{DS} =20 V, V _{GS} =10 V
Gate-source charge	Q _{gs}		14.5		nC	
Gate-drain charge	Q _{gd}		18.4		nC	
Gate plateau voltage	V _{plateau}		2.7		V	
Diode forward current	I _S			130		V _{GS} <V _{th}
Pulsed source current	I _{SP}			390	A	
Diode forward voltage	V _{SD}			1.3	V	I _S =20 A, V _{GS} =0 V
Reverse recovery time	t _{rr}		205		ns	I _S =20 A, di/dt=100 A/μs
Reverse recovery charge	Q _{rr}		557.4		nC	
Peak reverse recovery current	I _{rrm}		4.3		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) V_{DD}=30 V, R_G=50 Ω, L=0.3 mH, starting T_J=25 °C.
- 5) The value of R_{θJA} is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.

40V N-Channel Enhancement Mode MOSFET

Typical Characteristics

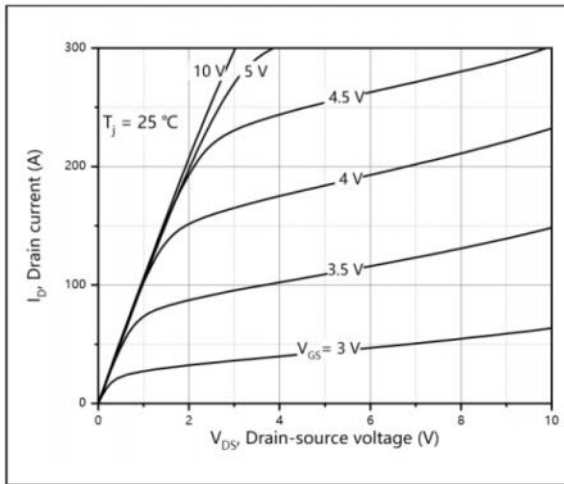


Figure 1, Typ. output characteristics

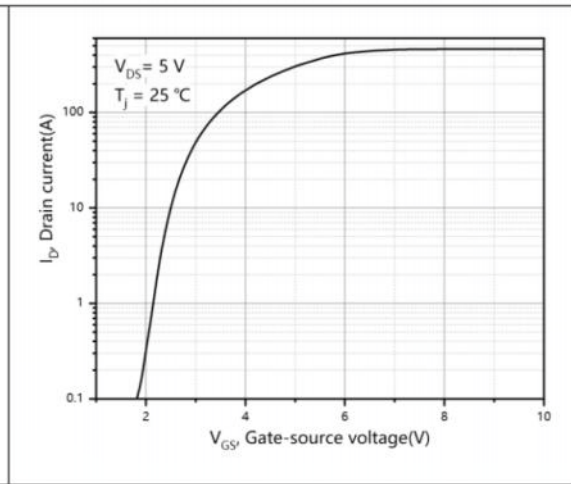


Figure 2, Typ. transfer characteristics

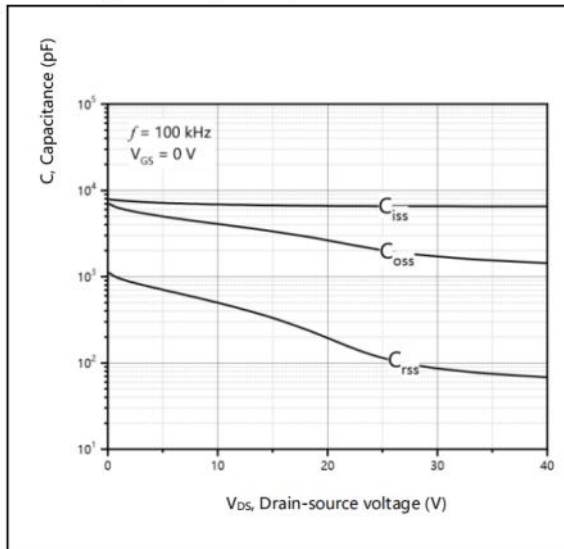


Figure 3, Typ. capacitances

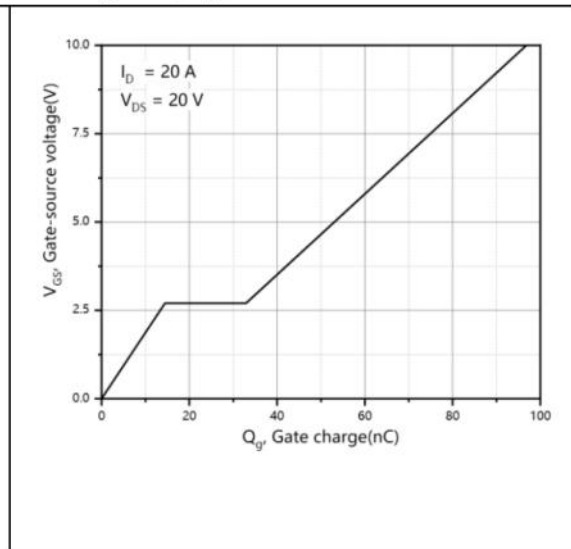


Figure 4, Typ. gate charge

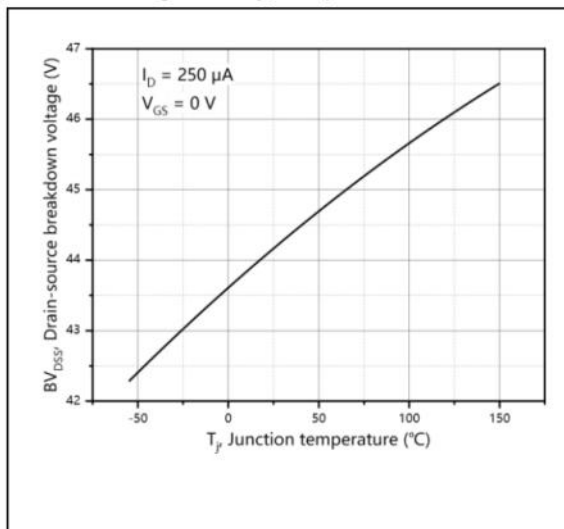


Figure 5, Drain-source breakdown voltage

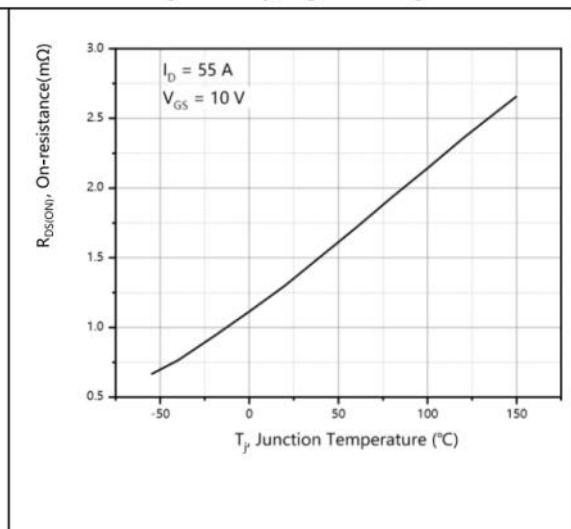


Figure 6, Drain-source on-state resistance

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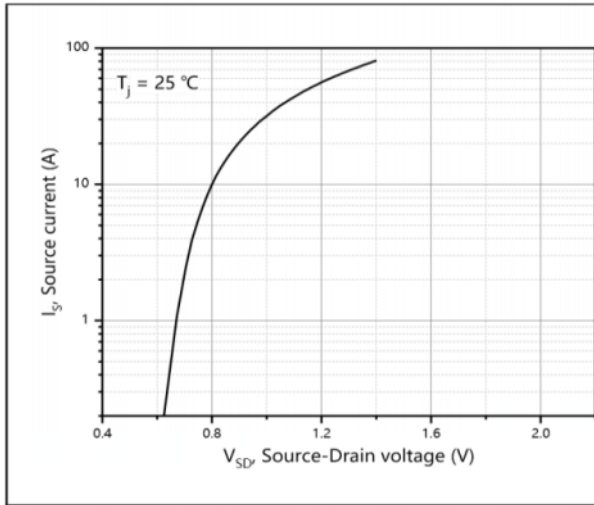


Figure 7, Forward characteristic of body diode

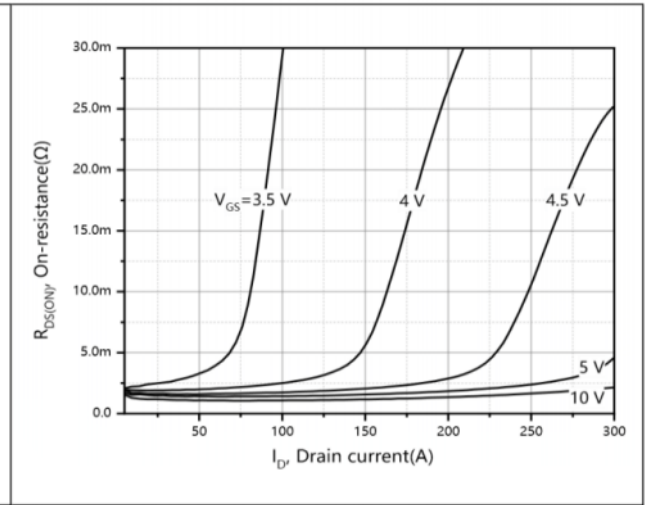


Figure 8, Drain-source on-state resistance

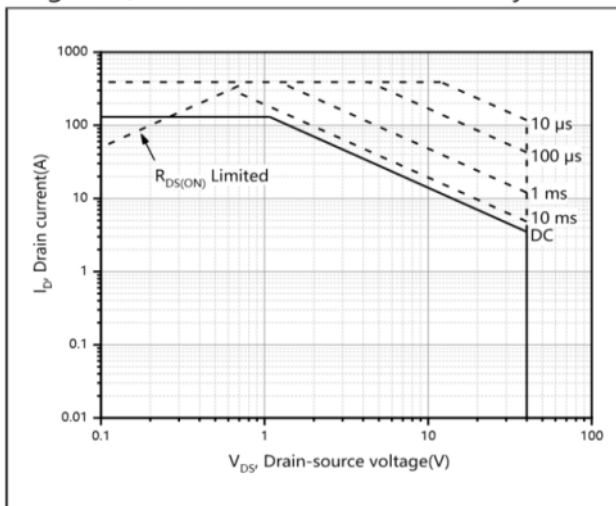


Figure 9, Safe operation area $T_C=25\text{ }^\circ\text{C}$

40V N-Channel Enhancement Mode MOSFET

Test circuits and waveforms

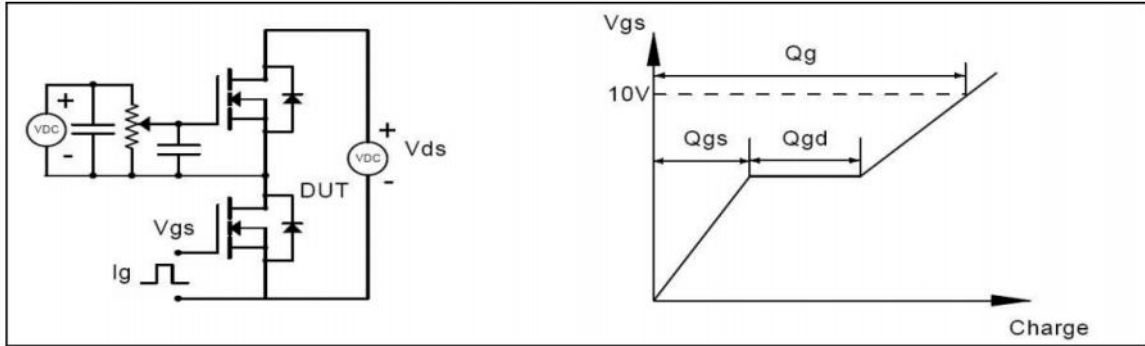


Figure 1. Gate charge test circuit & waveform

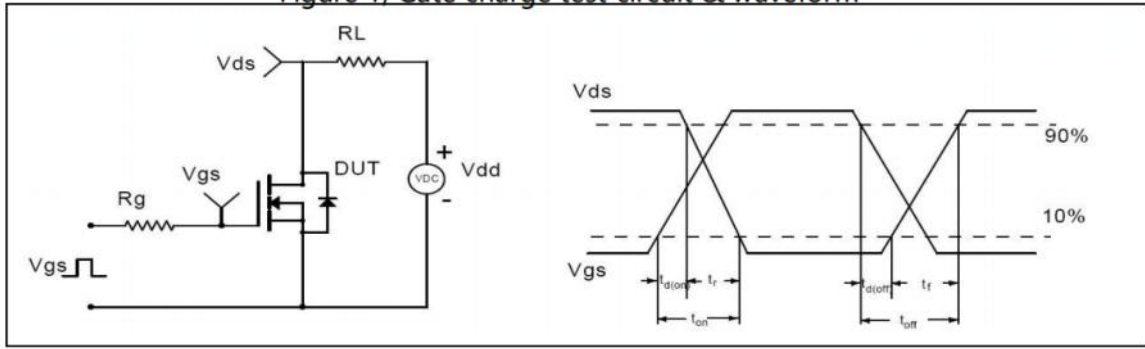


Figure 2. Switching time test circuit & waveforms

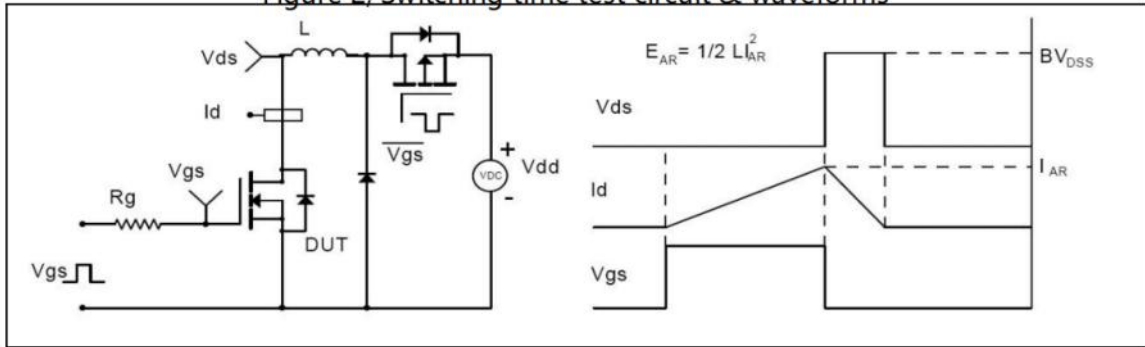


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

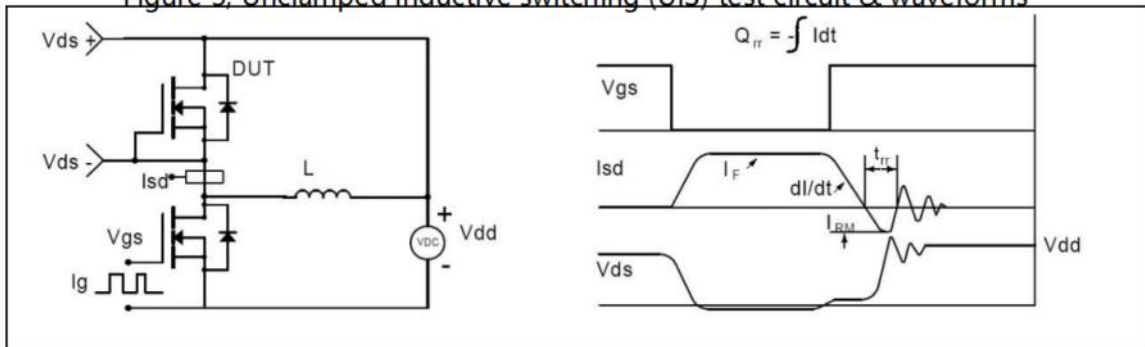
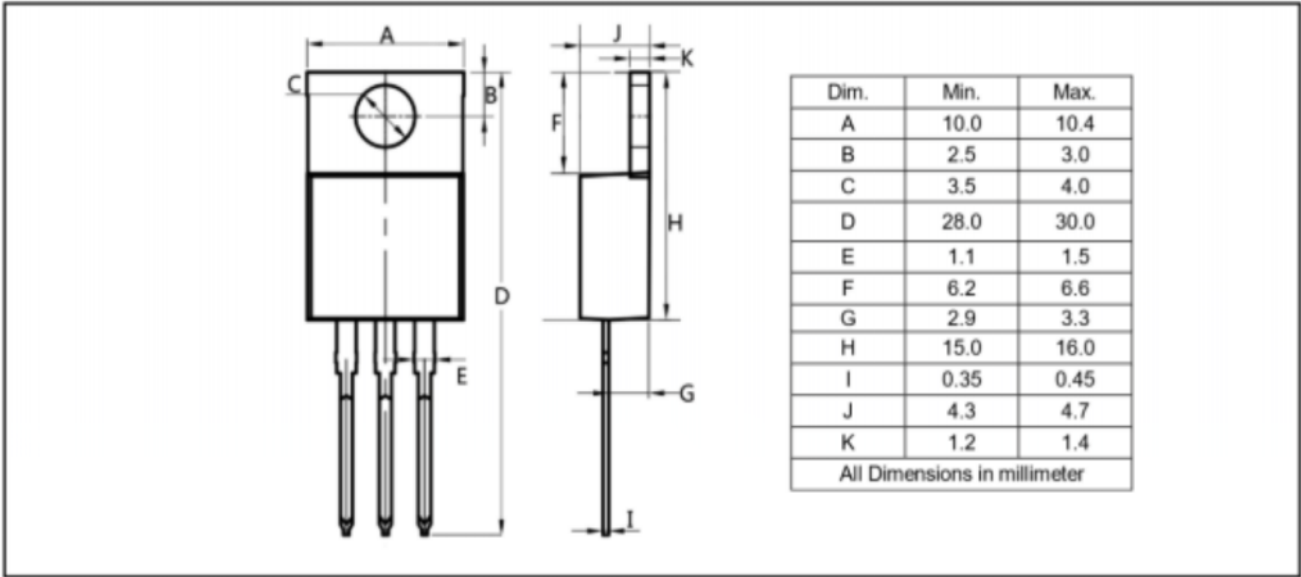


Figure 4. Diode reverse recovery test circuit & waveforms

40V N-Channel Enhancement Mode MOSFET

Package Mechanical Data-TO-220-3L



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