EVVOSEMI®
THINK CHANGE DO

ESD TVS MOS LDO Diode Sensor DC-DC

Product Specification

Domestic Part Number	EV-IRFR120N-T1
Overseas Part Number	IRFR120N
Equivalent Part Number	IRFR120N

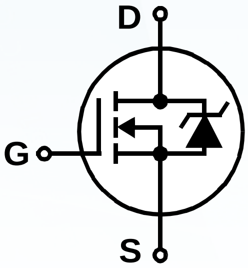
"T1" means TO-252

EV is the abbreviation of name EVVO

N-Channel Enhancement Mode MOSFET

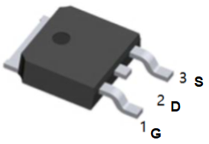
Description

The EV-IRFR120N-T1 is designed for surface mounting using vapor phase, infraredor wave soldering techniques . Power dissipation levels up to 1.5 watts are possible in typical surface mo-unt applications.



Features

V_{DS} (V) = 100V
I_D = 9.4A (V_{GS} = 10V)
$R_{DS(ON)}$ =210mΩ (V_{GS} = 10V)



TO-252(DPAK) top view

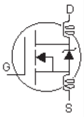
Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	9.4	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	6.6	
I_{DM}	Pulsed Drain Current ①⑥	38	
P_D @T_C = 25°C	Power Dissipation	48	W
	Linear Derating Factor	0.32	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②⑥	91	mJ
I_{AR}	Avalanche Current①⑥	5.7	A
E_{AR}	Repetitive Avalanche Energy①⑥	4.8	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

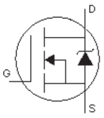
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	3.1	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount) **	——	50	
$R_{\theta JA}$	Junction-to-Ambient	——	110	

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	100	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.12	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.21		V_{GS} = 10V, I_D = 5.6A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	——	4.0	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	2.7	——	——	S	V_{DS} = 25V, I_D = 5.7A⑥
I_{DSS}	Drain-to-Source Leakage Current	——	——	25	μA	V_{DS} = 100V, V_{GS} = 0V
		——	——	250		V_{DS} = 80V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -20V
Q_g	Total Gate Charge	——	——	25	nC	I_D = 5.7A
Q_{gs}	Gate-to-Source Charge	——	——	4.8		V_{DS} = 80V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	11		V_{GS} = 10V, See Fig. 6 and 13 ④⑥
$t_{d(on)}$	Turn-On Delay Time	——	4.5	——	ns	V_{DD} = 50V
t_r	Rise Time	——	23	——		I_D = 5.7A
$t_{d(off)}$	Turn-Off Delay Time	——	32	——		R_G = 22Ω
t_f	Fall Time		23			R_D = 8.6Ω, See Fig. 10 ④⑥
L_D	Internal Drain Inductance	——	4.5	——	nH	Between lead, 6mm (0.25in.) from package and center of die contact⑤ 
L_S	Internal Source Inductance	——	7.5	——		
C_{iss}	Input Capacitance	——	330	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	92	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	54	——		ƒ = 1.0MHz, See Fig. 5⑥

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	9.4	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①⑥	——	——	38		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 5.5A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	99	150	ns	T_J = 25°C, I_F = 5.7A
Q_{rr}	Reverse RecoveryCharge	——	390	580	nC	di/dt = 100A/μs ④⑥
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② V_{DD} = 25V, starting T_J = 25°C, L = 4.7mH R_G = 25Ω, I_{AS} = 5.7A. (See Figure 12)

③ $I_{SD} \leq$ 5.7A, di/dt $\leq$ 240A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C

④ Pulse width $\leq$ 300μs; duty cycle $\leq$ 2%

⑤ This is applied for I-PAK, Ls of D-PAK is measured between lead and center of die contact

⑥ Uses IRF520N data and test conditions

** When mounted on 1" square PCB (FR-4 or G-10 Material) .
For recommended footprint and soldering techniques refer to application note #AN-994

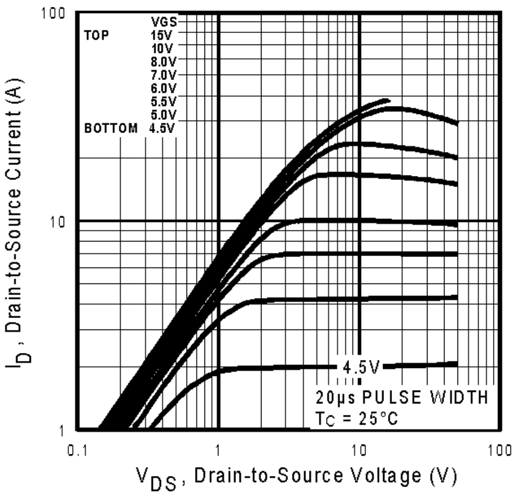


Fig 1. Typical Output Characteristics

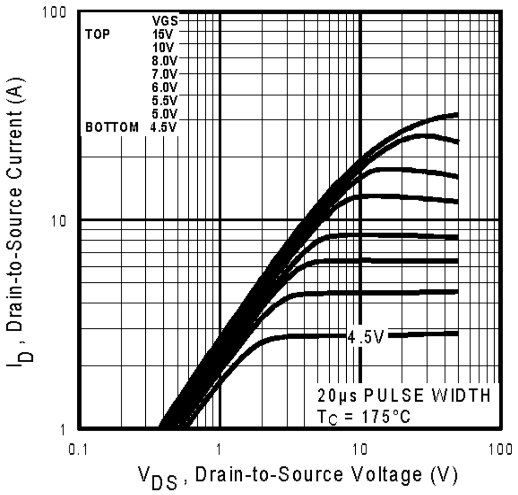


Fig 2. Typical Output Characteristics

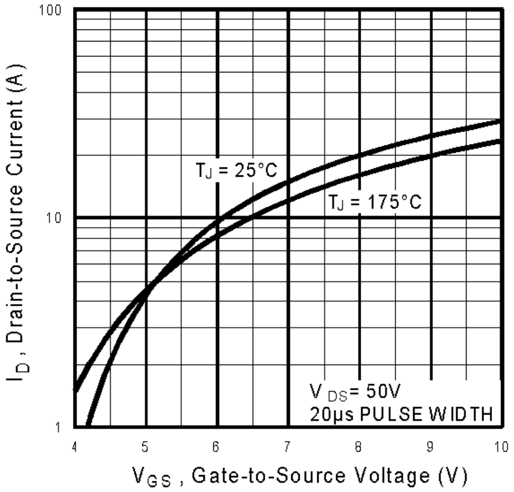


Fig 3. Typical Transfer Characteristics

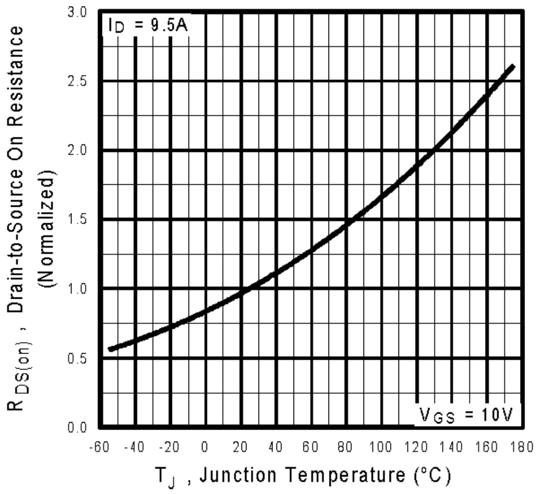


Fig 4. Normalized On-Resistance
Vs. Temperature

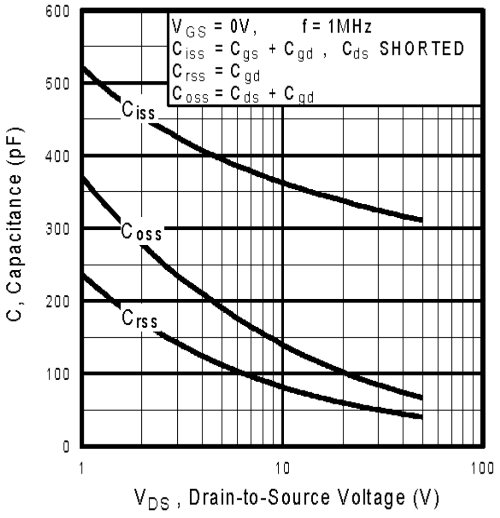


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

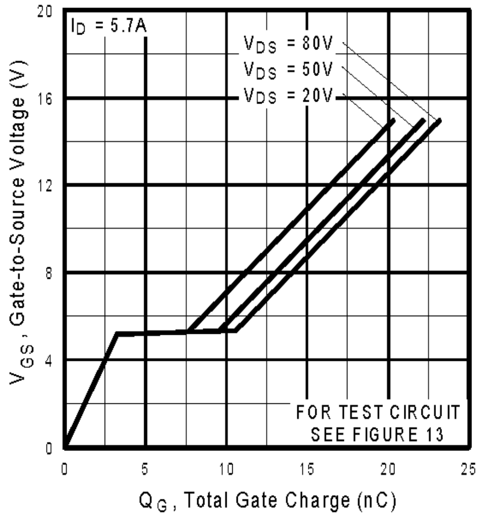


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

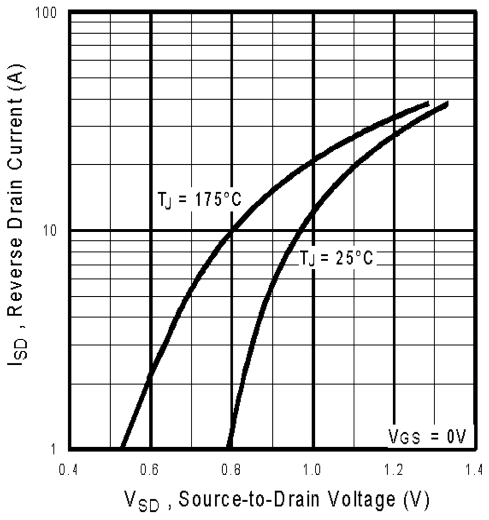


Fig 7. Typical Source-Drain Diode Forward Voltage

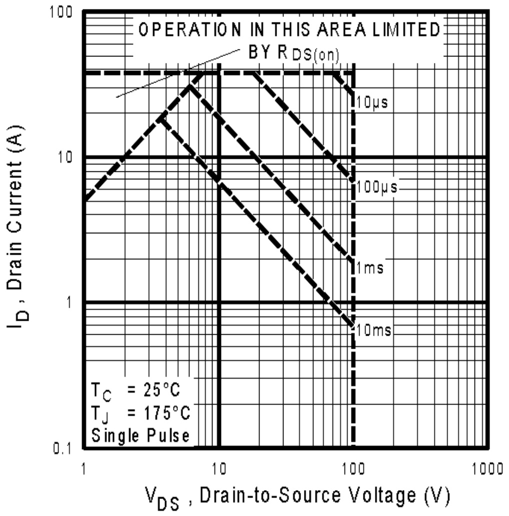


Fig 8. Maximum Safe Operating Area

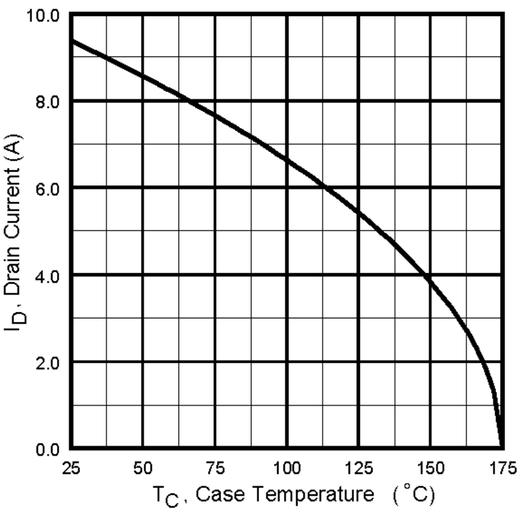


Fig 9. Maximum Drain Current Vs. Case Temperature

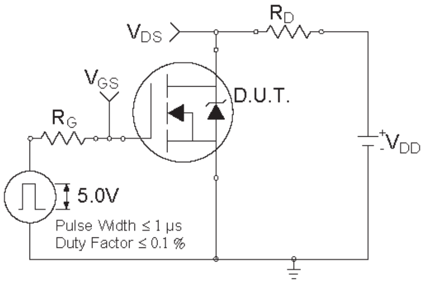


Fig 10a. Switching Time Test Circuit

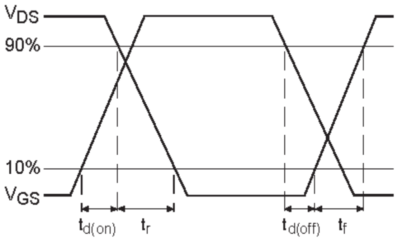


Fig 10b. Switching Time Waveforms

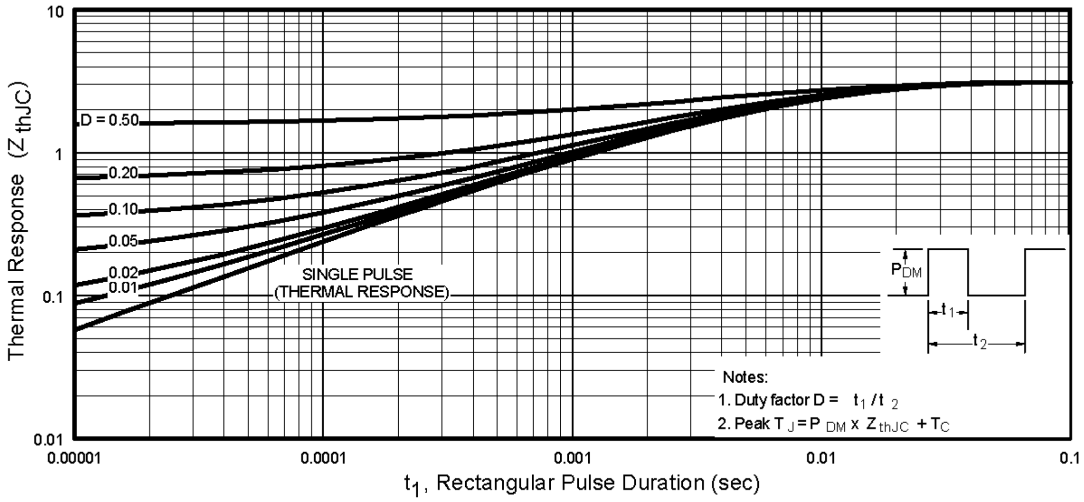


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

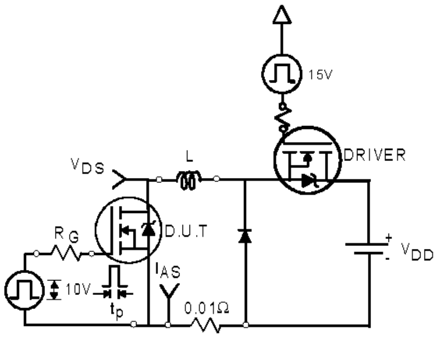


Fig 12a. Unclamped Inductive Test Circuit

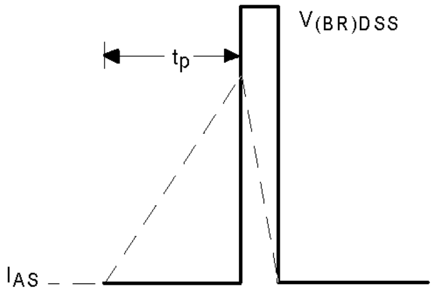


Fig 12b. Unclamped Inductive Waveforms

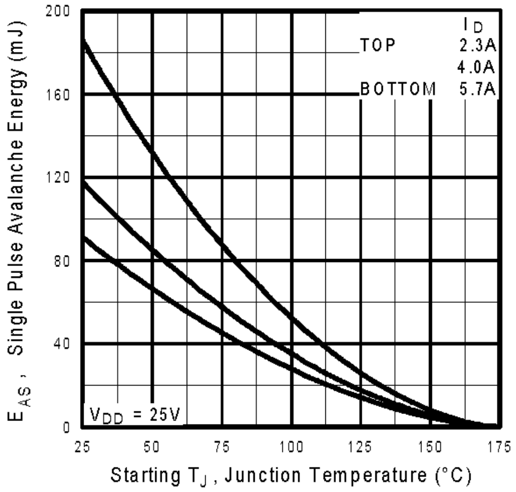


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

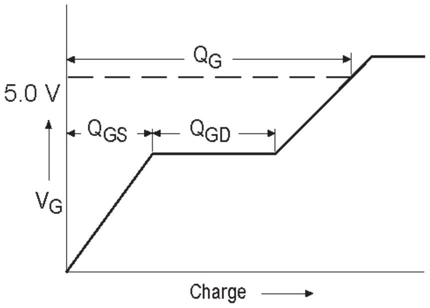


Fig 13a. Basic Gate Charge Waveform

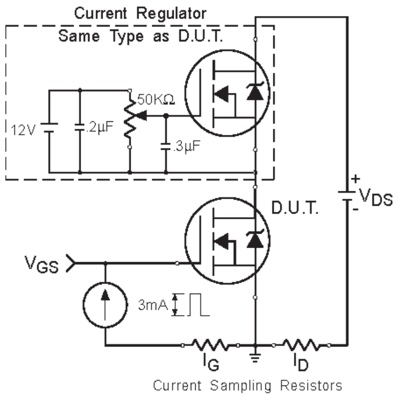
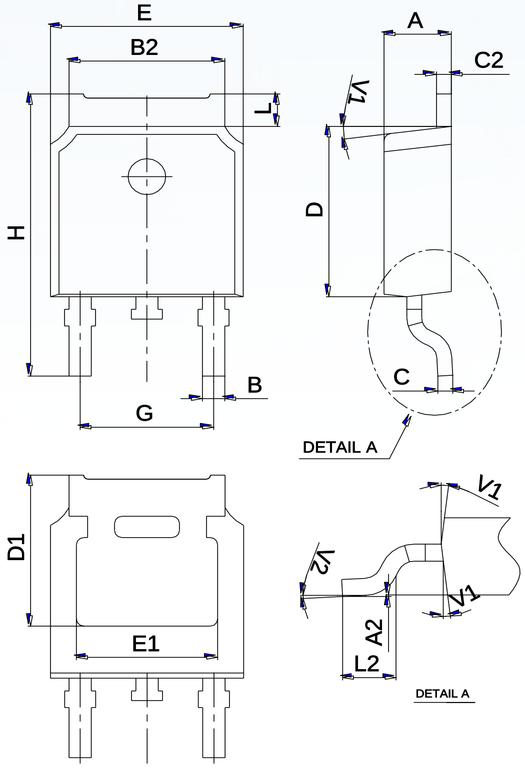


Fig 13b. Gate Charge Test Circuit

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Ordering information

Order code	Package	Baseqty	Delivery mode
EV-IRFR120N-T1	TO-252	2500	Tape and reel

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