VFSA010R089NA

Datasheet

General Description

VFSA010R089NA MOSFET is based on unique device design to achieve low $RDS_{(ON)}$, low gate charge, fast switching and excellent avalanche characteristics.

Symbol

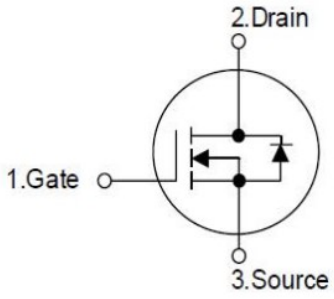


Figure 1 Symbol of VFSA010R089NA

Features

- Low RDS(ON) & FOM
- $R_{DS(ON)\_max}$ = 8.9mΩ@V_{GS} = 10V
- Extremely low switching loss
- Fast switching and soft recovery

Package Type

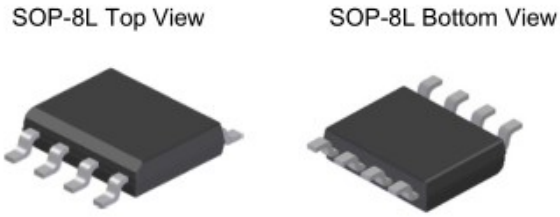


Figure 2 Package Type of VFSA010R089NA

Application

- BMS
- Switched mode power supply
- DC-DC converter
- Solar inverter
- UPS and energy inverter

Ordering Information

Product Name	Package
VFSA010R089NA	SOP-8L

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current Note 1, T_C=25ºC	I_D	17.6	A
Pulsed Drain Current Note 2	I_{DM}	50	A
Max Power Dissipation Note 3, T_C=25ºC	P_D	10.3	W
Avalanche Current, Single Pulse Note 5	I_{AS}	23.2	A
Avalanche Energy, Single Pulse Note 5	E_{AS}	26.3	mJ
Operation Junction temperature	T_J	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		12.1		ºC/W
Thermal Resistance, Junction-to-Ambient Note4	$R_{\theta JA}$		40.5		

Notes:

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) P_D is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25 °C.
5) V_{DS}=50 V,V_{GS}=10 V, L=0.1 mH, starting T_J=25 °C.

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	100			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=80V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	1.0	1.6	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=12A		6.8	8.9	mΩ
		V_{GS}=4.5V, I_D=10A		8.5	11	mΩ
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=0V,f=1MHz		2.3		Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{GS}=0V		2540		pF
Output Capacitance	C_{OSS}	V_{DS}=50V		780		pF
Reverse Transfer Capacitance	C_{RSS}	f=1MHz		43		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=50V		12.6		ns
Rise Time	t_r	V_{GS}=10V		29.0		
Turn-off Delay Time	$t_{d(off)}$	R_L=4.1Ω		55.6		
Fall Time	t_f	R_{GEN}=15Ω		32.4		
Switching Characteristics						
Total Gate Charge (@VGS=10V)	Q_g	V_{GS}=0 to 10V		52.7		nC
Total Gate Charge (@VGS=4.5V)	Q_g	V_{DS}=50V		27.4		
Gate to Source Charge	Q_{gs}	I_D=12A		8.0		
Gate to Drain Charge	Q_{gd}			12.0		
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=10A		0.7	1.2	V
Reverse Recovery Time	t_{rr}	VR=30V		49.7		ns
Reverse Recovery Charge	Q_{rr}	I_F=12A		51.8		nC
Peak Reverse Recovery Current	I_{rrm}	di/dt=100A/us		2.1		A

Typical Performance Characteristics

Figure 3: Typ. Output Characteristics

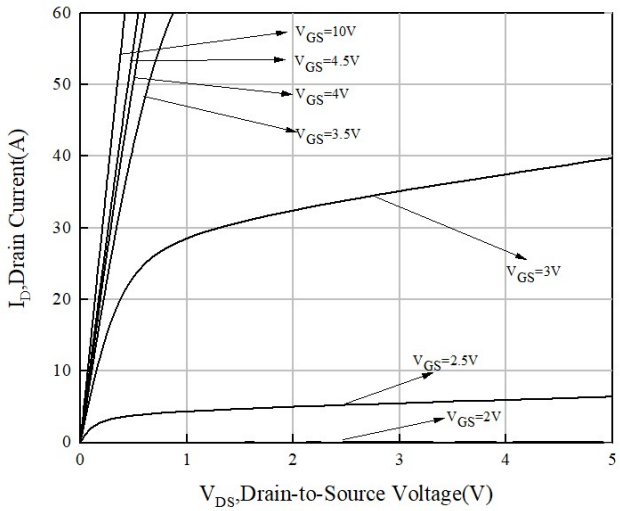


Figure 4: Typ. Transfer Characteristics

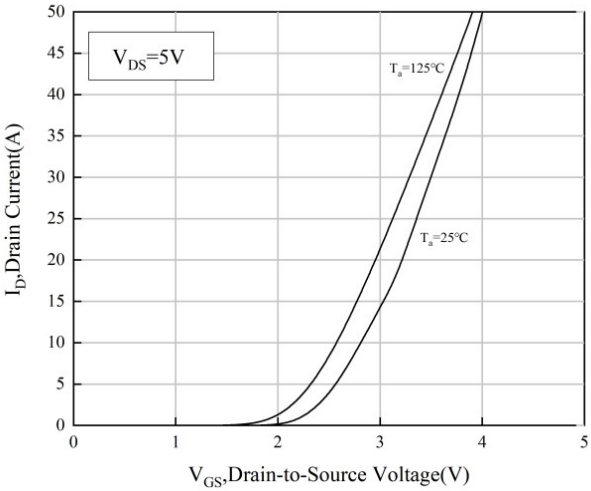


Figure 5: Drain-Source On-State Resistance

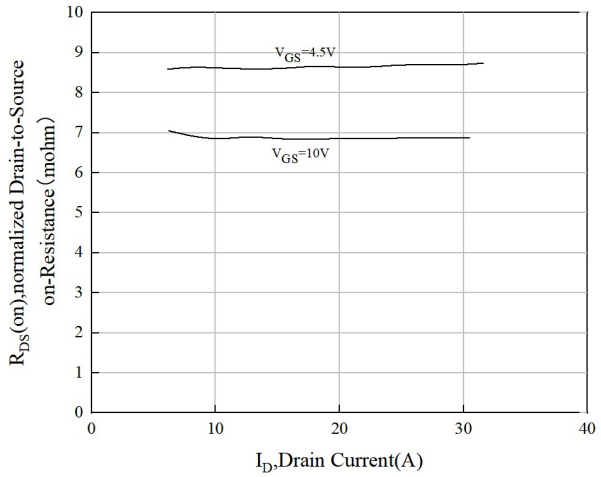


Figure 6: Drain-Source On-State Resistance

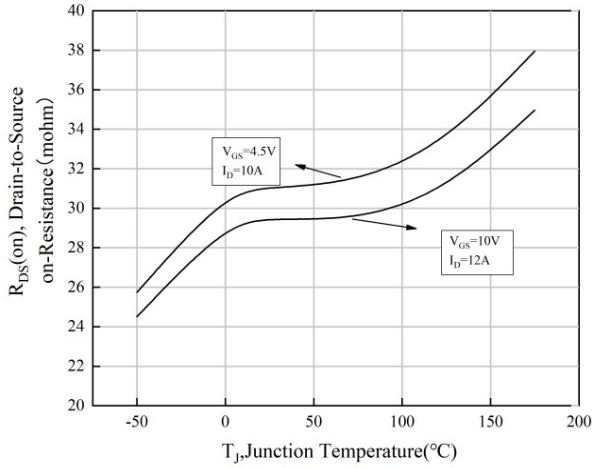


Figure 7: On-Resistance vs.Gate-source voltage

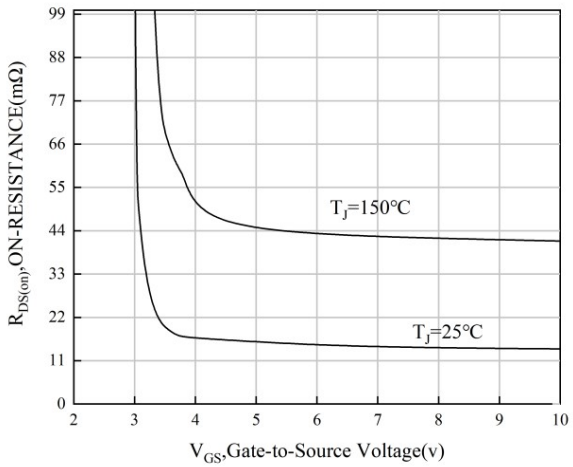


Figure 8: Forward Characteristics of Body Diode

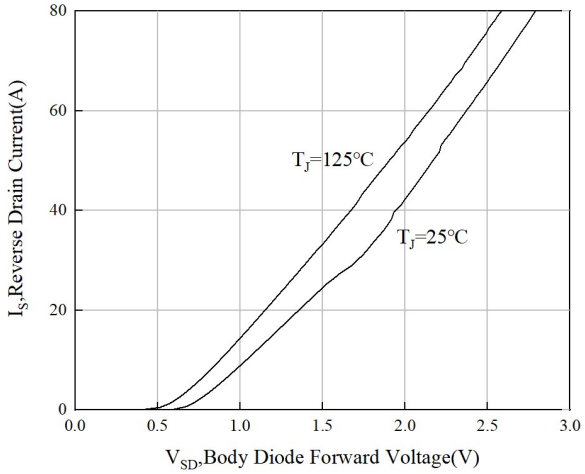


Figure 9: Gate Charge Characteristics

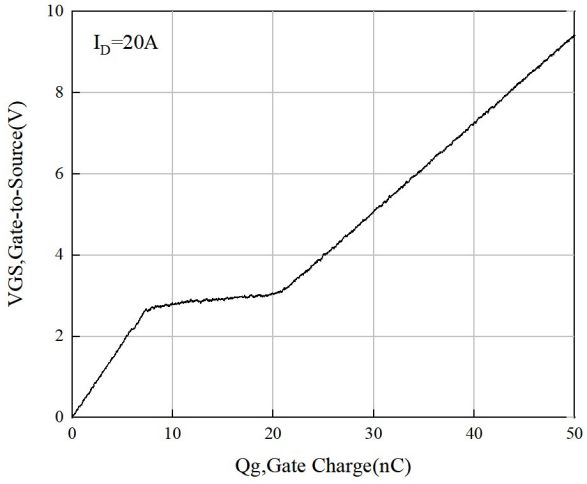


Figure 10: Typ. Capacitances

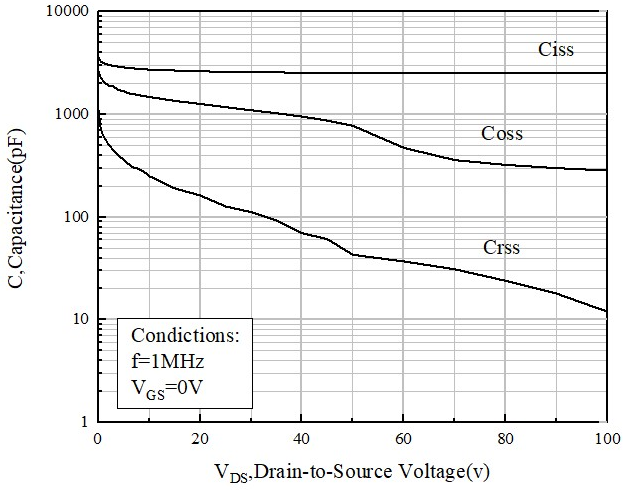


Figure11: Safe Operating Area

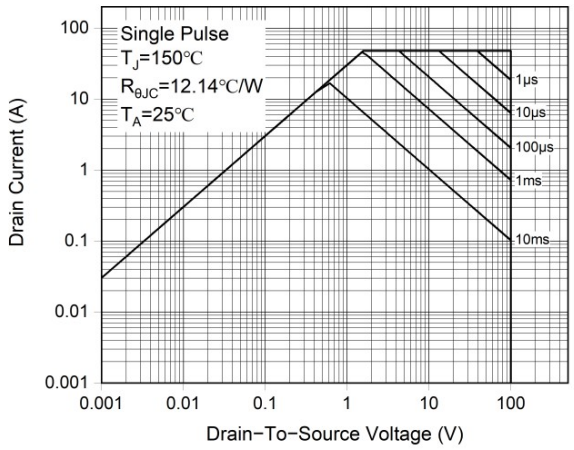


Figure12: Power Dissipation

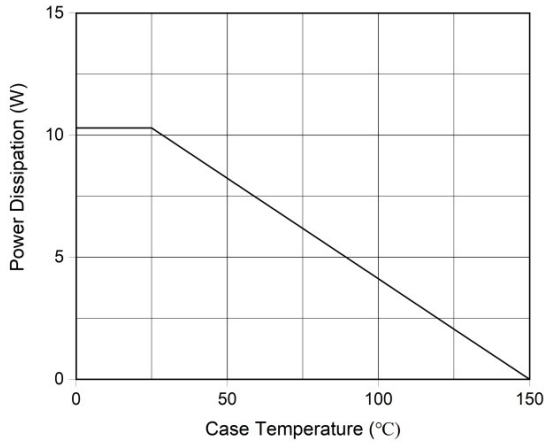


Figure 13: Single pulse power rating, Junction to case

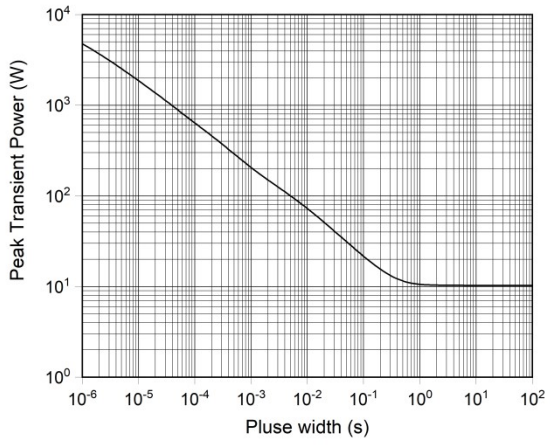
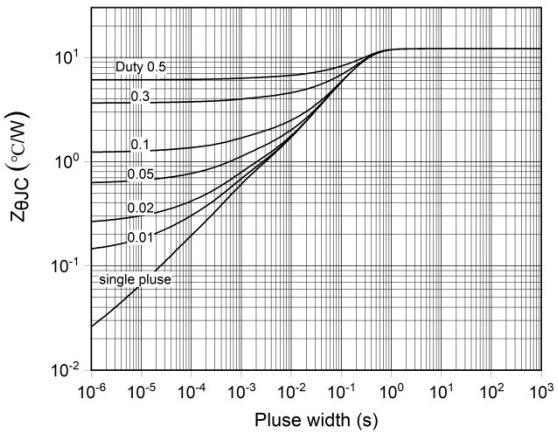
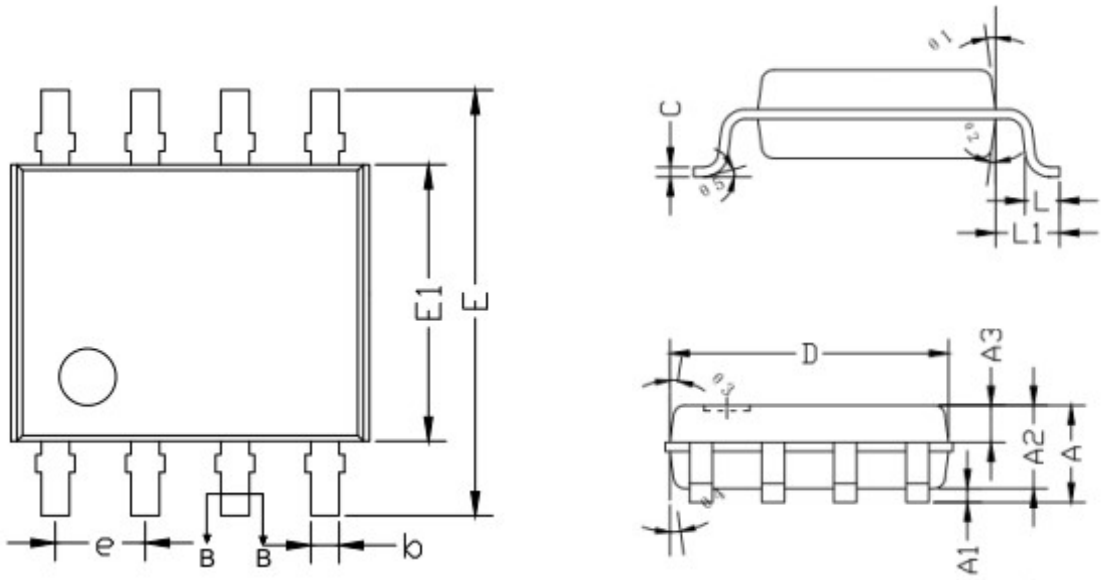


Figure 14: Max transient thermal impedance



Mechanical Dimensions (SOP-8L Unit: mm)



Symbol	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.65
A1	0.10	--	0.25
A2	1.40	1.42	1.50
A3	0.60	0.65	0.70
b	0.33	--	0.47
b1	0.32	0.41	0.44
c	0.20	--	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.90	6.00	6.20
E1	3.85	3.90	4.00
e	1.27BSC		
L	0.50	0.60	0.70
L1	1.05BSC		
θ1	6°		12°
θ2	6°		12°
θ3	5°		10°
θ4	5°		10°
θ5	0°		6°

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