

Features

- N-Channel, 5V Logic Level Control
- Enhancement mode
- Low on-resistance @ $V_{GS}=4.5\text{ V}$
- Fast Switching
- Pb-free lead plating; RoHS compliant

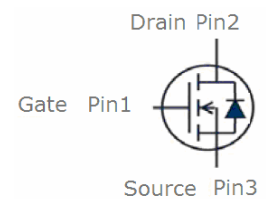


Halogen-Free

Part ID	Package Type	Marking	Tape and reel information
VSR090N10MS	SOT89	090N10	3000pcs/reel

V_{DS}	100	V
$R_{DS(on),typ@V_{GS}=10V}$	70	mΩ
$R_{DS(on),typ@V_{GS}=4.5V}$	75	mΩ
I_D	5	A

SOT89



Maximum ratings, at $T_j=25\text{ }^{\circ}\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	100	V
V_{GS}	Gate-Source voltage	± 20	V
I_D	Continuous drain current@ $V_{GS}=10V$	$T_C=25^{\circ}\text{C}$	5
		$T_A=70^{\circ}\text{C}$	3.2
I_{DM}	Pulse drain current tested ①	$T_C=25^{\circ}\text{C}$	20
P_D	Maximum power dissipation	$T_C=25^{\circ}\text{C}$	1.25
I_S	Diode Continuous Forward Current	$T_C=25^{\circ}\text{C}$	5
T_J	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{STG}	Storage and operating temperature range	-55 to 175	$^{\circ}\text{C}$
Thermal characteristics			
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	100	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	15	$^{\circ}\text{C/W}$

Typical Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	100	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current(Tc=25°C)	V _{DS} =100V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125°C)	V _{DS} =100V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =250μA	1.0	1.8	2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =10V, I _D =5A	--	70	90	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =4.5V, I _D =2A	--	75	100	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =30V,V _{GS} =0V, f=1MHz	--	435	--	pF
C _{oss}	Output Capacitance		--	45	--	pF
C _{rss}	Reverse Transfer Capacitance		--	30	--	pF
Q _g	Total Gate Charge	V _{DS} =50V,I _D =1A, V _{GS} =10V	--	9	--	nC
Q _{gs}	Gate-Source Charge		--	1.7	--	nC
Q _{gd}	Gate-Drain Charge		--	1.6	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =30V, I _D =1A, R _G =6.8Ω, V _{GS} =4.5V	--	6	--	nS
t _r	Turn-on Rise Time		--	15	--	nS
t _{d(off)}	Turn-Off Delay Time		--	16	--	nS
t _f	Turn-Off Fall Time		--	10	--	nS
Source- Drain Diode Characteristics@ T _J = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =5A,V _{GS} =0V	--	0.83	1.20	V
t _{rr}	Reverse Recovery Time	T _J =25°C,I _{sd} =5A, V _{GS} =0V	--	43	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=500A/μs		185		nC

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature
 ② Pulse width ≤ 300μs; duty cycles ≤ 2%.

Typical Characteristics

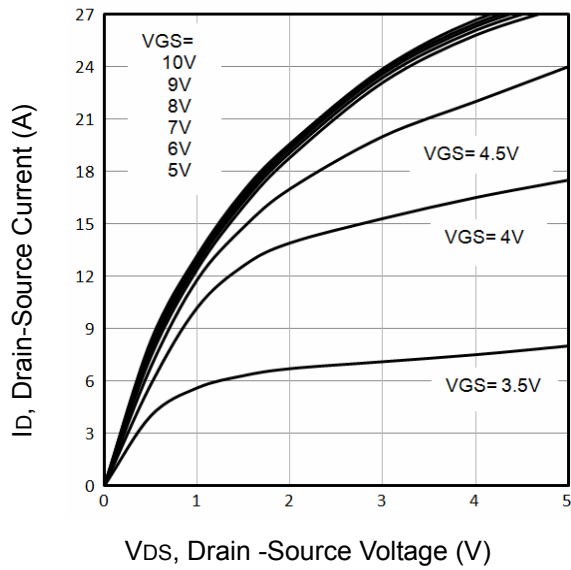


Fig1. Typical Output Characteristics

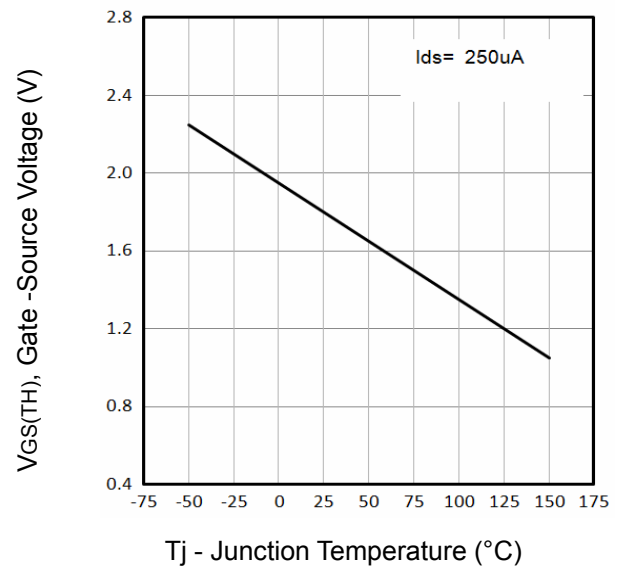


Fig2. Threshold Voltage Vs. Temperature

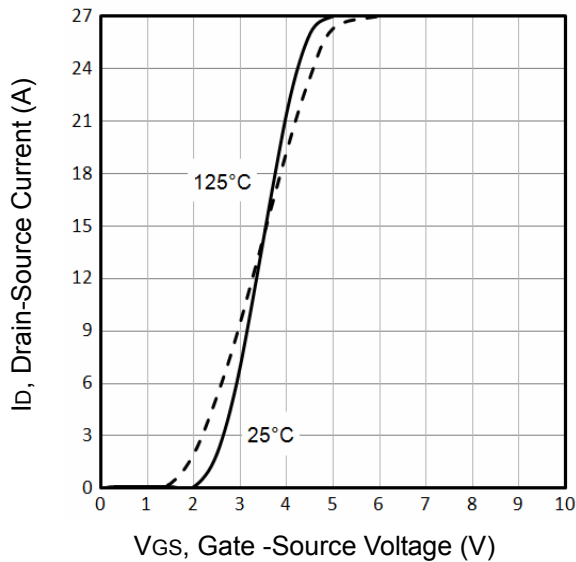


Fig3. Typical Transfer Characteristics

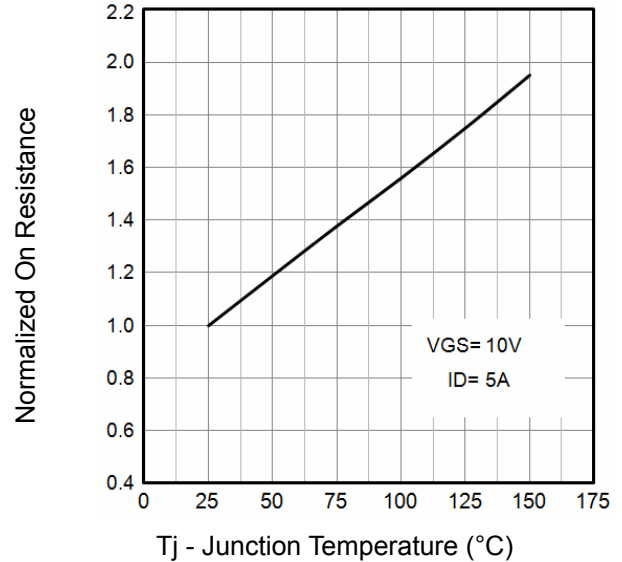


Fig4. Normalized On-Resistance Vs. Temperature

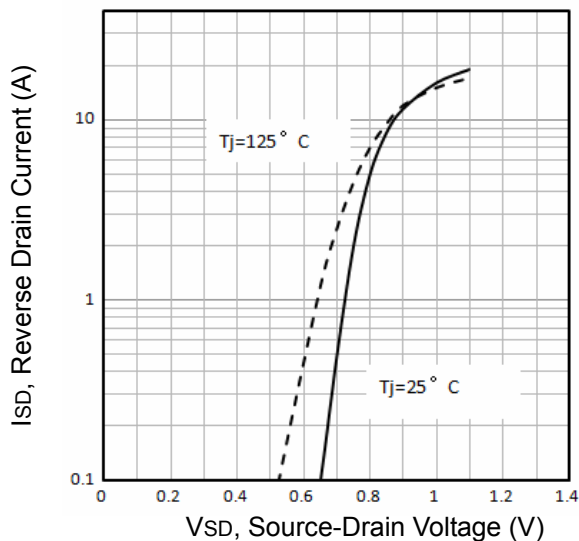


Fig5. Typical Source-Drain Diode Forward Voltage

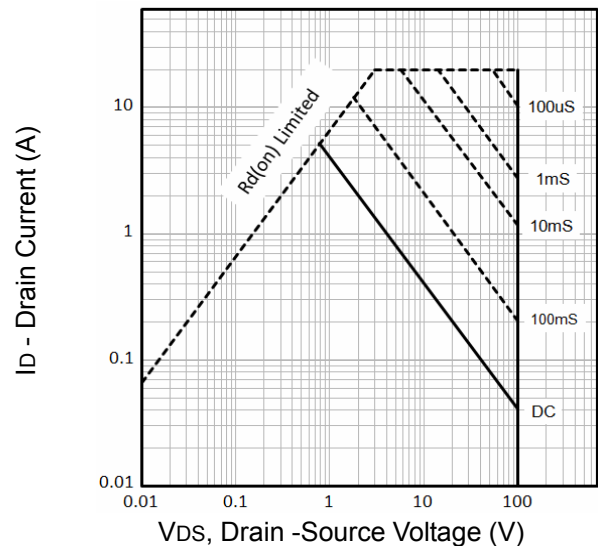


Fig6. Maximum Safe Operating Area

Typical Characteristics

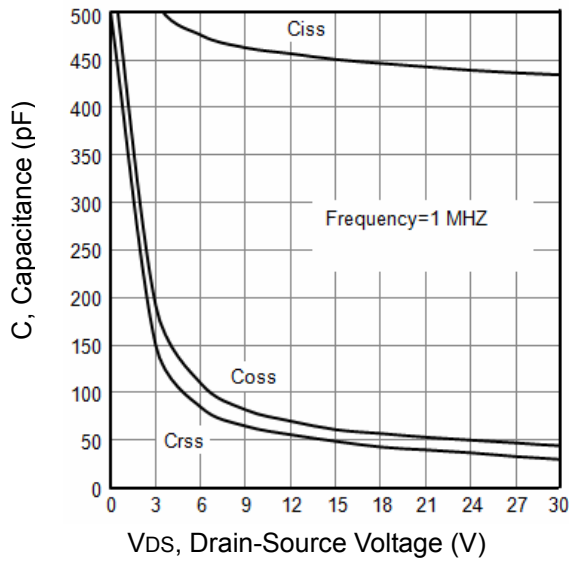


Fig7. Typical Capacitance Vs. Drain-Source

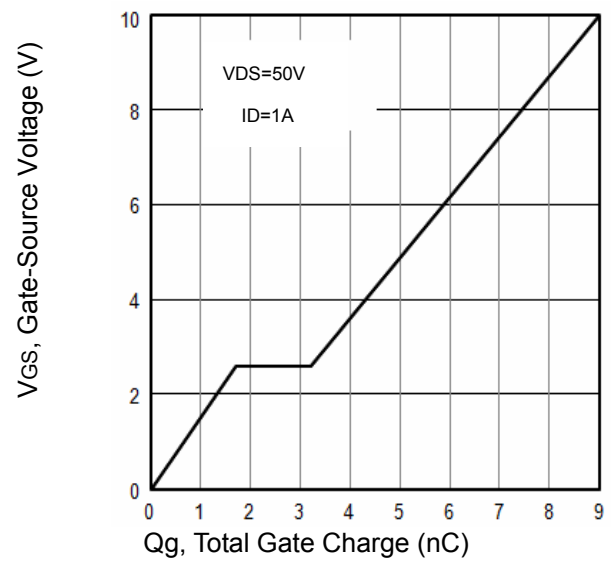


Fig8. Typical Gate Charge Vs. Gate-Source

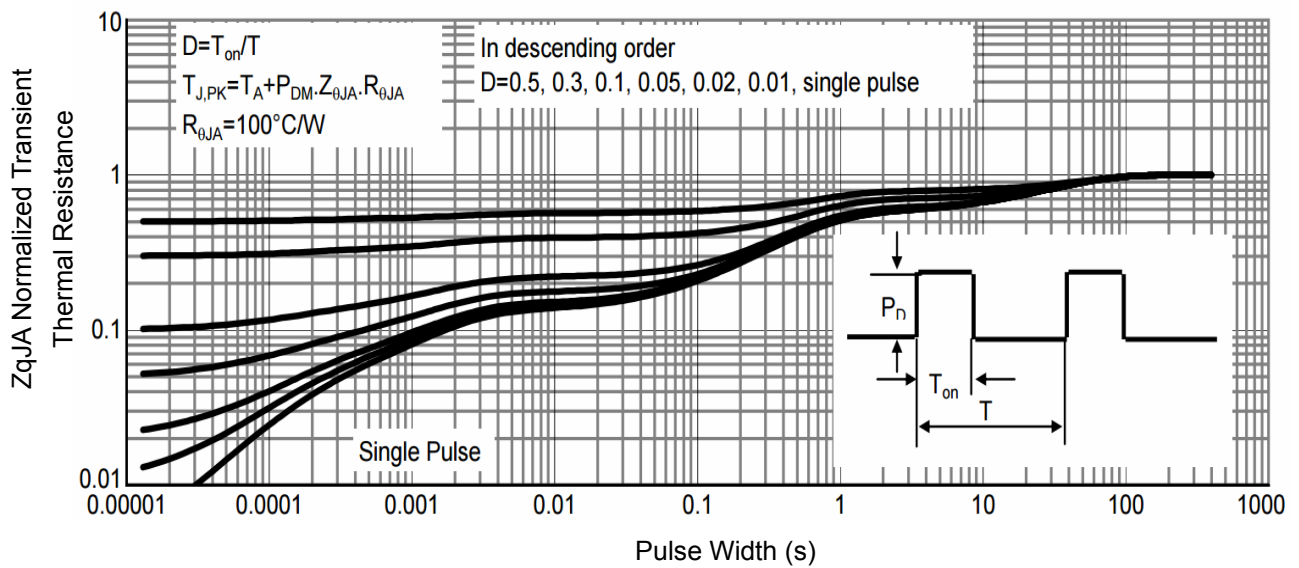


Fig9. Normalized Maximum Transient Thermal

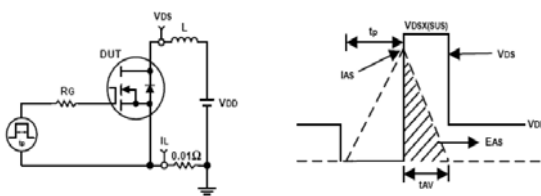


Fig10. Unclamped Inductive Test Circuit and waveforms

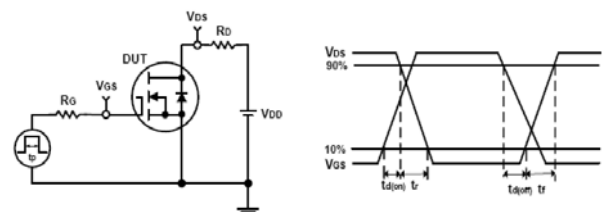
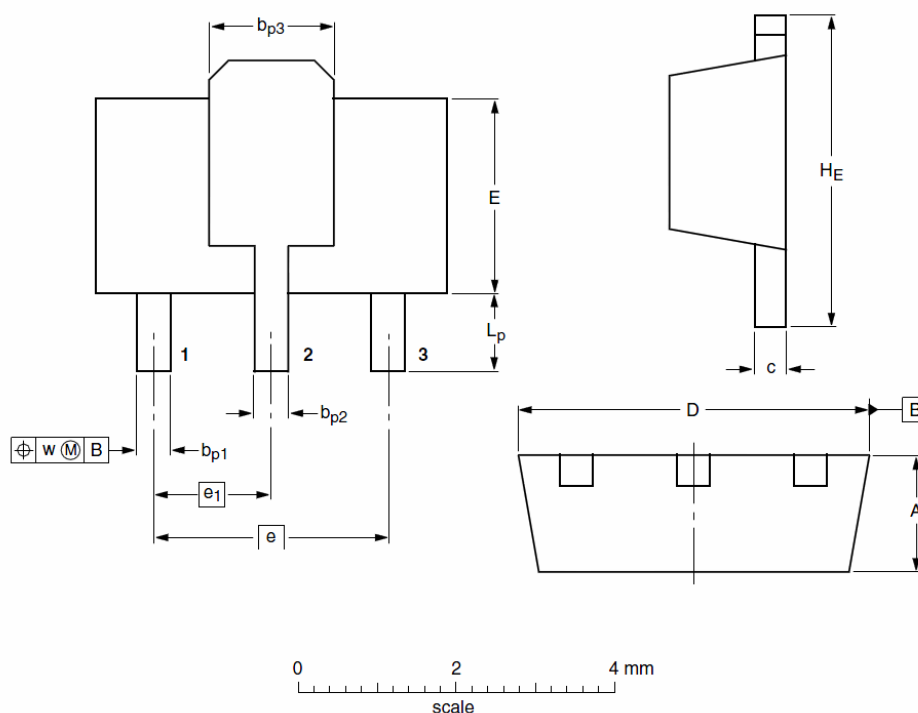


Fig11. Switching Time Test Circuit and waveforms

SOT89 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	1.40	1.50	1.60	b_{p1}	0.35	0.43	0.48
b_{p2}	0.40	0.47	0.53	b_{p3}	1.40	1.68	1.80
c	0.23	0.35	0.44	D	4.40	4.48	4.60
E	2.40	2.51	2.60	e	--	3.00	--
e_1	--	1.50	--	H_e	3.75	4.08	4.25
L_p	0.80	0.90	1.20	w	--	0.13	--

Customer Service

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