

Features

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

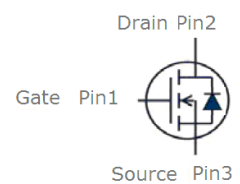
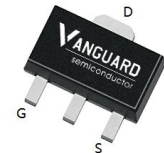


Halogen-Free

Part ID	Package Type	Marking	Tape and reel information
VS6640AR	SOT-89	6640AR	3000pcs/Reel

V_{DS}	60	V
$R_{DS(on),TYP} @ V_{GS}=10\text{ V}$	67	mΩ
$R_{DS(on),TYP} @ V_{GS}=4.5\text{ V}$	84	mΩ
I_D	9	A

SOT89



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

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	60	V
I_S	Diode continuous forward current	$T_C=25^{\circ}\text{C}$ 9	A
I_D	Continuous drain current @ $V_{GS}=10\text{V}$	$T_C=25^{\circ}\text{C}$ 9	A
		$T_C=100^{\circ}\text{C}$ 5.6	A
I_{DM}	Pulse drain current tested ①	$T_C=25^{\circ}\text{C}$ 36	A
P_D	Maximum power dissipation	$T_C=25^{\circ}\text{C}$ 10	W
V_{GS}	Gate-Source voltage	±20	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	12	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	100	$^{\circ}\text{C/W}$

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	60	--	--	V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V,V _{GS} =0V	--	--	1	μA	
	Zero Gate Voltage Drain Current(T _j =125°C)	V _{DS} =60V,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	1.3	2	2.4	V	
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =10V, I _D =5A	--	67	83	mΩ	
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =4.5V, I _D =4A	--	84	104	mΩ	
Dynamic Electrical Characteristics @ T _j = 25°C (unless otherwise stated)							
C _{iss}	Input Capacitance	V _{DS} =30V,V _{GS} =0V, f=1MHz	400	510	600	pF	
C _{oss}	Output Capacitance				30	80	pF
C _{rss}	Reverse Transfer Capacitance				20	60	pF
R _g	Gate Resistance	f=1MHz	--	3.4	--	Ω	
Q _g	Total Gate Charge	V _{DS} =30V,I _D =5A, V _{GS} =10V	--	11	--	nC	
Q _{gs}	Gate-Source Charge		--	4	--	nC	
Q _{gd}	Gate-Drain Charge		--	3.5	--	nC	
Switching Characteristics							
t _{d(on)}	Turn-on Delay Time	V _{DD} =30V, I _D =5A, R _G =3Ω, V _{GS} =10V	--	7.5	--	nS	
t _r	Turn-on Rise Time		--	4.5	--	nS	
t _{d(off)}	Turn-Off Delay Time		--	22.5	--	nS	
t _f	Turn-Off Fall Time		--	9	--	nS	
Source- Drain Diode Characteristics@ T _j = 25°C (unless otherwise stated)							
V _{SD}	Forward on voltage	I _{SD} =5A,V _{GS} =0V	--	0.9	1.2	V	
t _{rr}	Reverse Recovery Time	T _j =25°C,I _{sd} =5A, V _{GS} =0V	--	10	--	nS	
Q _{rr}	Reverse Recovery Charge	di/dt=500A/μs		15		nC	

NOTE:

① Repetitive rating; pulse width limited by max. junction temperature.

② Pulse width $\leq 300\mu s$; duty cycles $\leq 2\%$.

Typical Characteristics

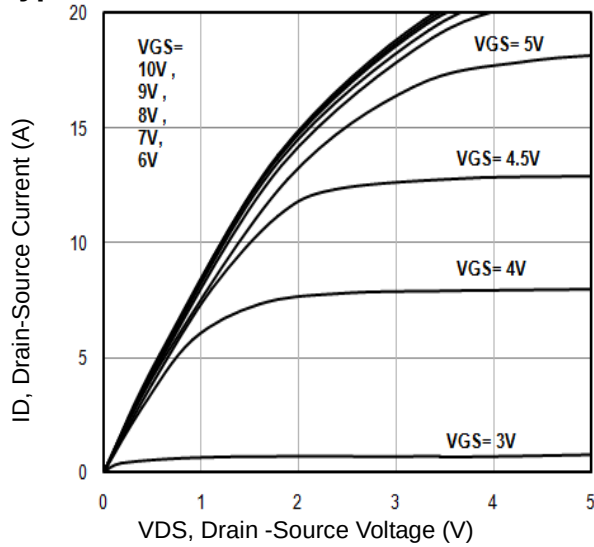


Fig1. Typical Output Characteristics

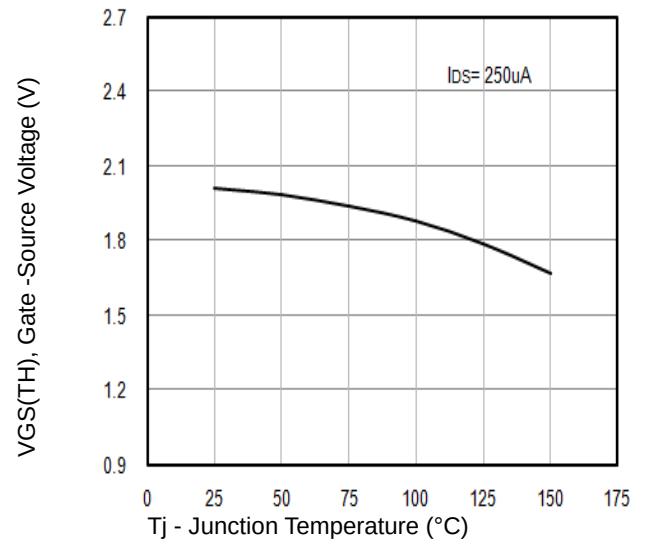


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_J

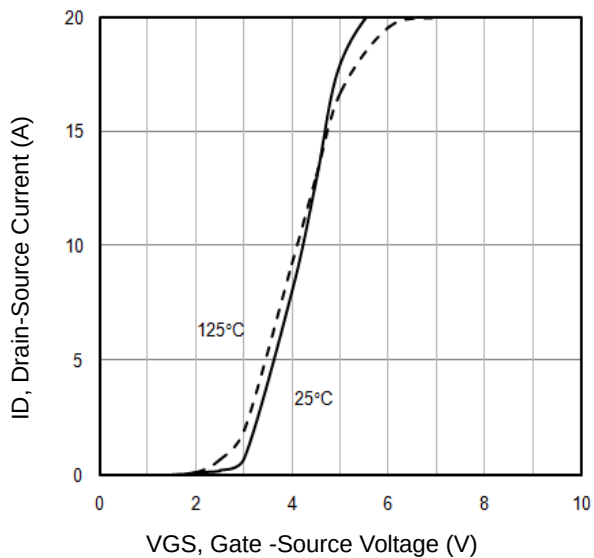


Fig3. Typical Transfer Characteristics

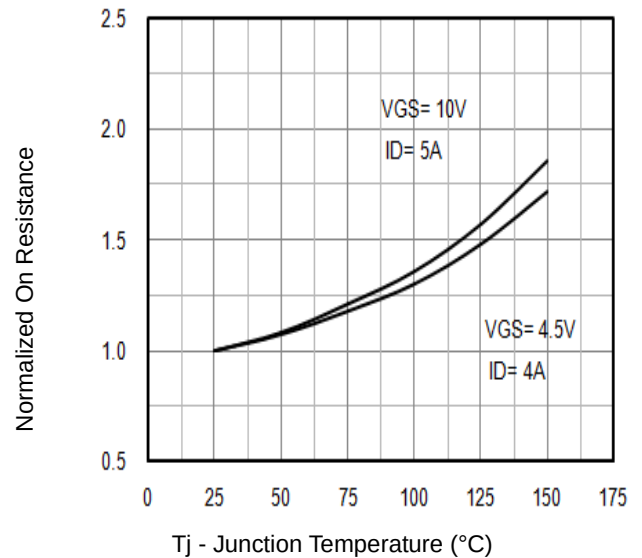


Fig4. Normalized On-Resistance Vs. T_J

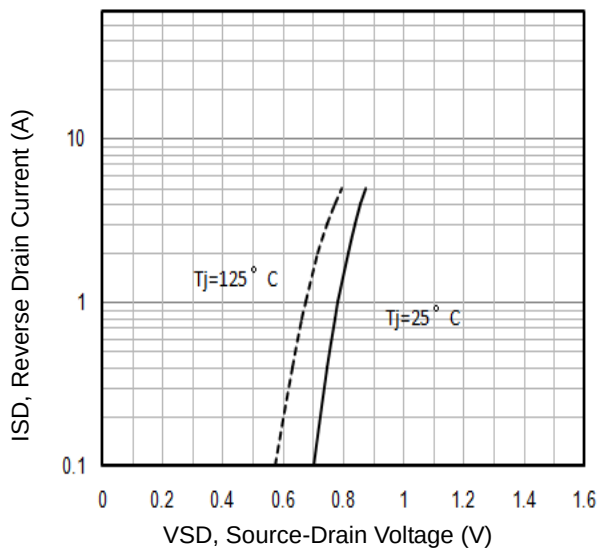


Fig5. Typical Source-Drain Diode Forward Voltage

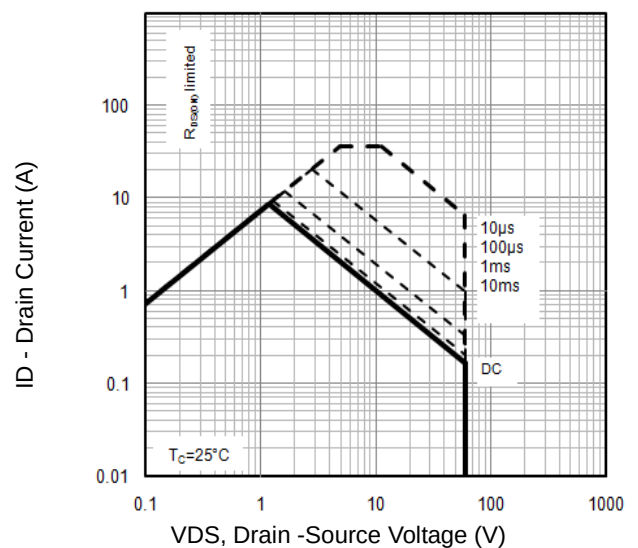


Fig6. Maximum Safe Operating Area

Typical Characteristics

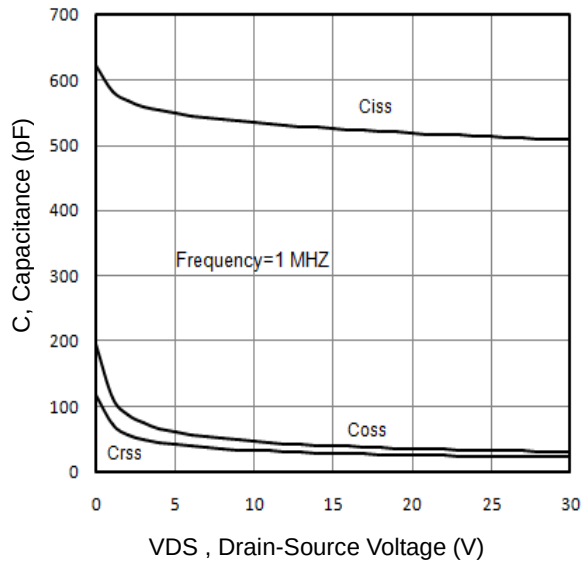


Fig7. Typical Capacitance Vs. Drain-Source Voltage

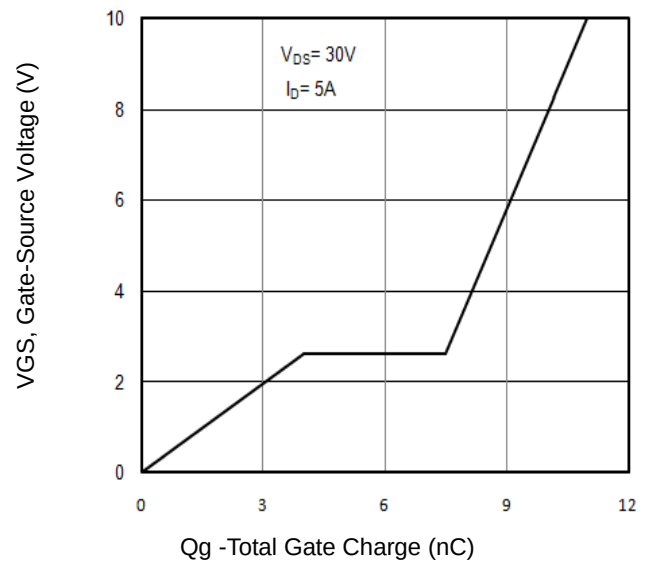


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

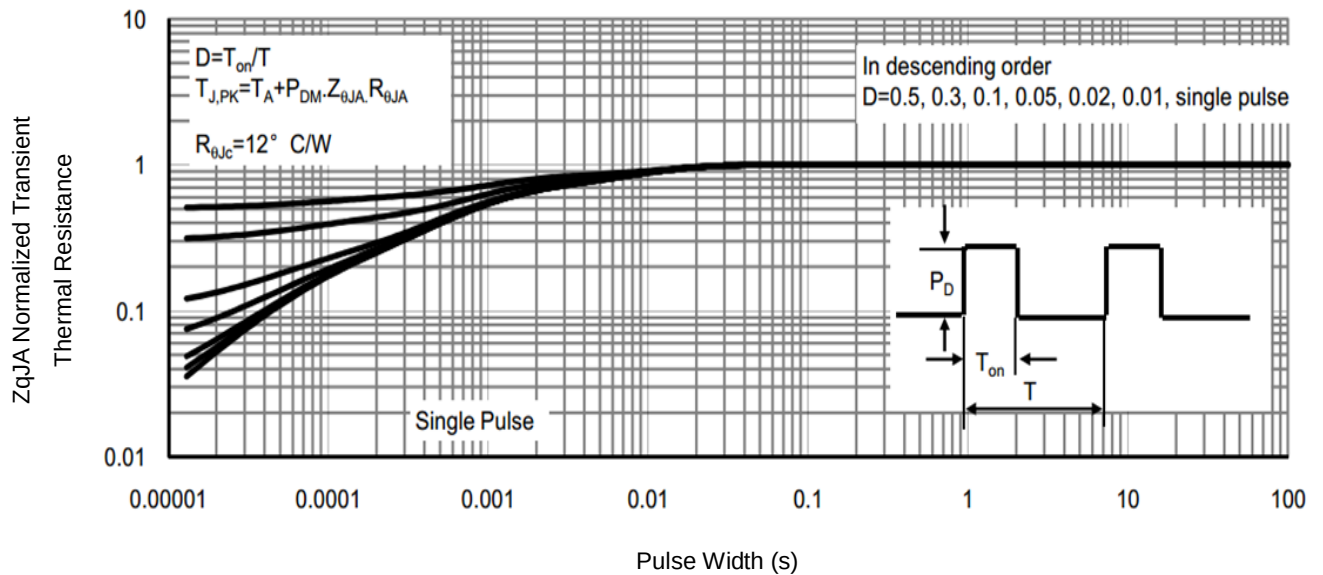


Fig9. Normalized Maximum Transient Thermal Impedance

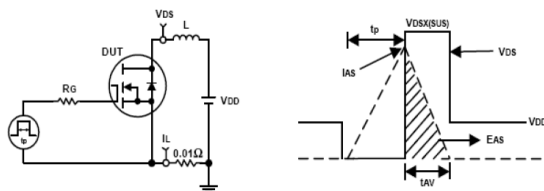


Fig10. Unclamped Inductive Test Circuit and waveforms

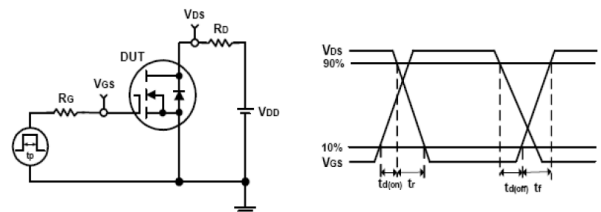
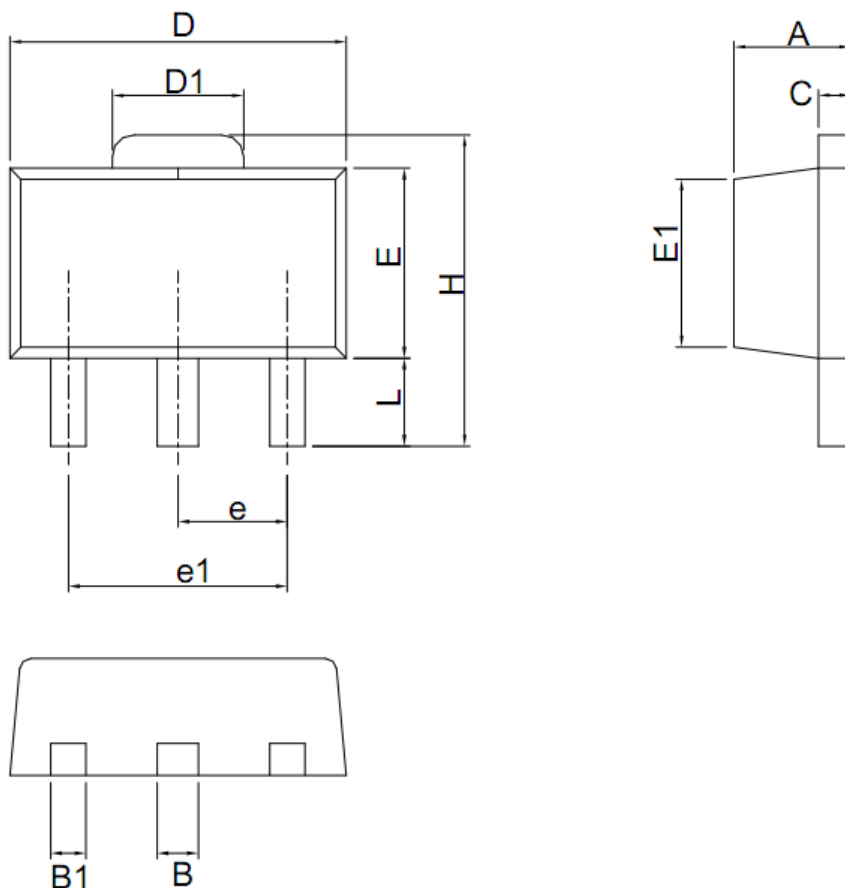


Fig11. Switching Time Test Circuit and waveforms

SOT89 Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	1.40	1.50	1.60
B	0.44	0.51	0.56
B1	0.36	0.42	0.48
C	0.35	0.40	0.44
D	4.40	4.50	4.60
D1	1.62	1.70	1.83
E	2.40	2.50	2.60
E1	2.13		2.29
e		1.50 BSC	
e1		3.00 BSC	
H	3.94	4.20	4.25
L	0.89	1.00	1.20

Notes:

1. Refer to JEDEC TO-243 variation AA

Customer Service

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