

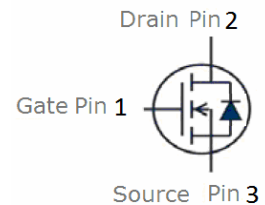
## Features

- N-Channel
- Enhancement mode
- Low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5\text{ V}$
- Fast Switching
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant



$V_{DS}$	30	V
$R_{DS(on),Typ} @ V_{GS}=10\text{ V}$	16	$m\Omega$
$R_{DS(on),Typ} @ V_{GS}=4.5\text{ V}$	22	$m\Omega$
$I_D$	30	A

TO-251-S



Part ID	Package Type	Marking	Tape and reel information
VSI018N03MS	TO-251-S	018N03M	80pcs/Tube

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

Symbol	Parameter	Rating	Unit	
$V_{(BR)DSS}$	Drain-Source breakdown voltage	30	V	
$I_D$	Continuous drain current@ $V_{GS}=10\text{V}$	$T_C=25^\circ\text{C}$	30	A
		$T_C=100^\circ\text{C}$	19	A
$I_{DM}$	Pulse drain current tested ①	$T_C=25^\circ\text{C}$	100	A
EAS	Avalanche energy, single pulsed ②	$L=0.1\text{mH}$	11	mJ
$P_D$	Maximum power dissipation	$T_C=25^\circ\text{C}$	42	W
$V_{GS}$	Gate-Source voltage	$\pm 20$	V	
$T_{STG}$	Storage and operating temperature range	-55 to 175	$^\circ\text{C}$	

### Thermal characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	55	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.5	$^\circ\text{C/W}$

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	30	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (T <sub>c</sub> =25°C)	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	--	--	1	μA
	Zero Gate Voltage Drain Current (T <sub>c</sub> =125°C)	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	--	--	100	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.2	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance <sup>③</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =15A	--	16	18.5	mΩ
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance <sup>③</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	--	22	25	mΩ
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance <sup>③</sup>	V <sub>GS</sub> =4.2V, I <sub>D</sub> =2A	--	23	28	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	--	445	--	pF
C <sub>oss</sub>	Output Capacitance		--	75	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	40	--	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =10V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V	--	15	--	nC
Q <sub>gs</sub>	GateSource Charge		--	4.5	--	nC
Q <sub>gd</sub>	GateDrain Charge		--	5.0	--	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turnon Delay Time	V <sub>DD</sub> =15V, I <sub>D</sub> =6A, R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =10V	--	6	--	nS
t <sub>r</sub>	Turnon Rise Time		--	14	--	nS
t <sub>d(off)</sub>	TurnOff Delay Time		-	21	--	nS
t <sub>f</sub>	TurnOff Fall Time		--	10	--	nS
<b>Source Drain Diode Characteristics</b>						
I <sub>SD</sub>	Sourcedrain current(Body Diode)	T <sub>c</sub> =25°C	30	--	--	A
V <sub>SD</sub>	Forward on voltage	T <sub>J</sub> =25°C, I <sub>SD</sub> =15A, V <sub>GS</sub> =0V	--	0.91	1.3	V

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.1mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 15A, V<sub>GS</sub> = 10V. Part not recommended for use above this value
- ③ Pulse width ≤ 300μs; duty cycles ≤ 2%.

Typical Characteristics

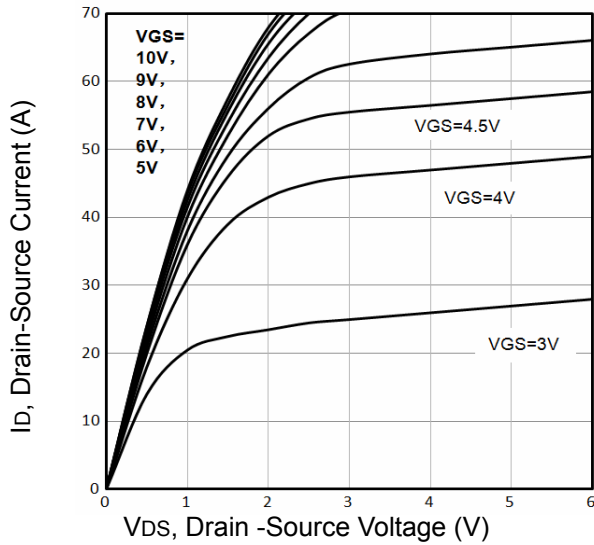


Fig1. Typical Output Characteristics

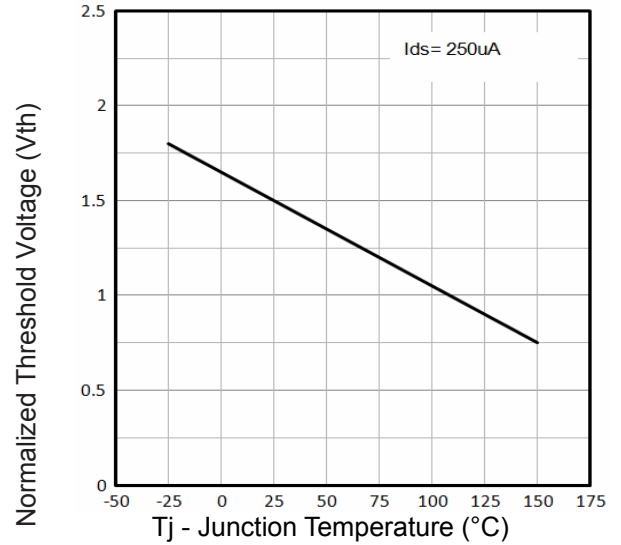


Fig2. Normalized Threshold Voltage Vs. Temperature

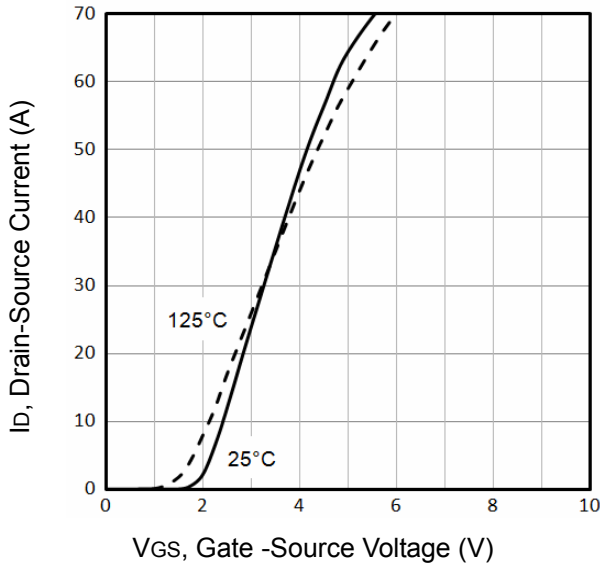


Fig3. Typical Transfer Characteristics

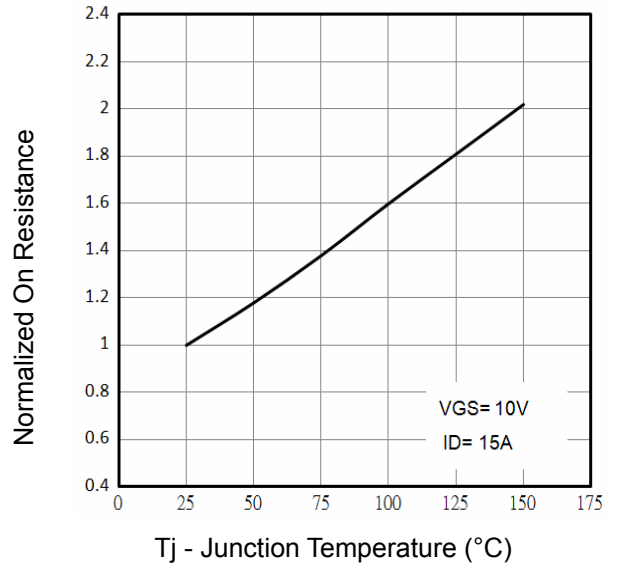


Fig4. Normalized On-Resistance Vs. Temperature

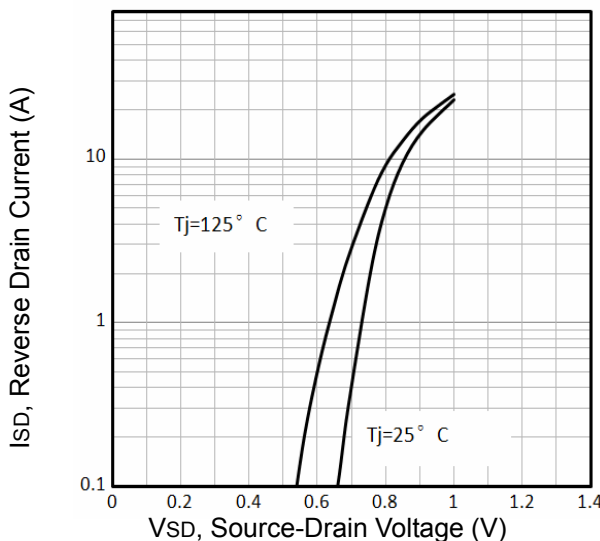


Fig5. Typical Source-Drain Diode Forward Voltage

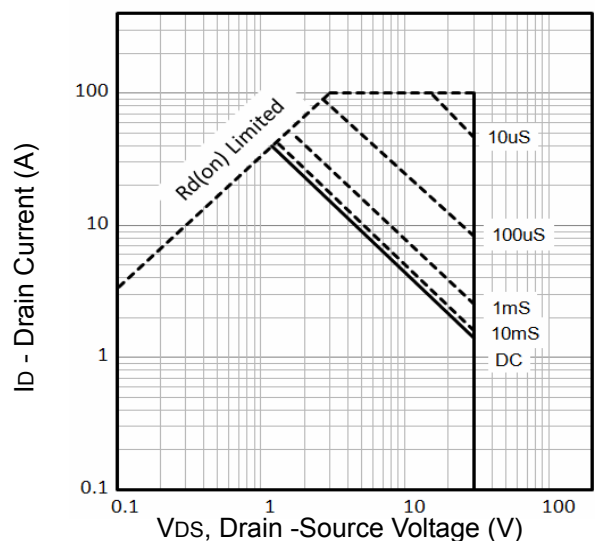


Fig6. Maximum Safe Operating Area

Typical Characteristics

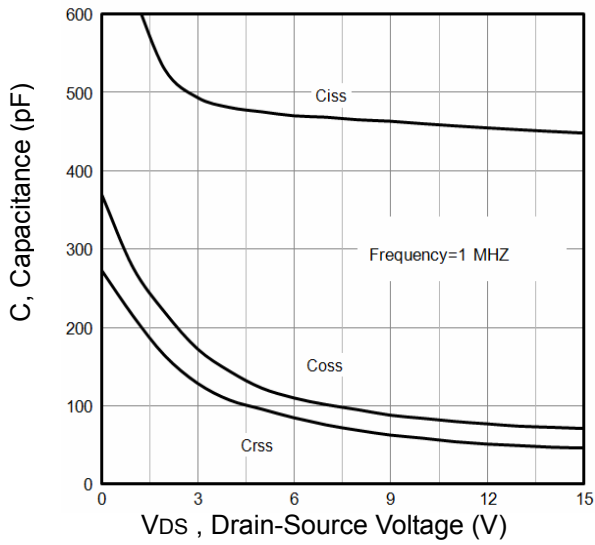


Fig7. Typical Capacitance Vs.Drain-Source Voltage

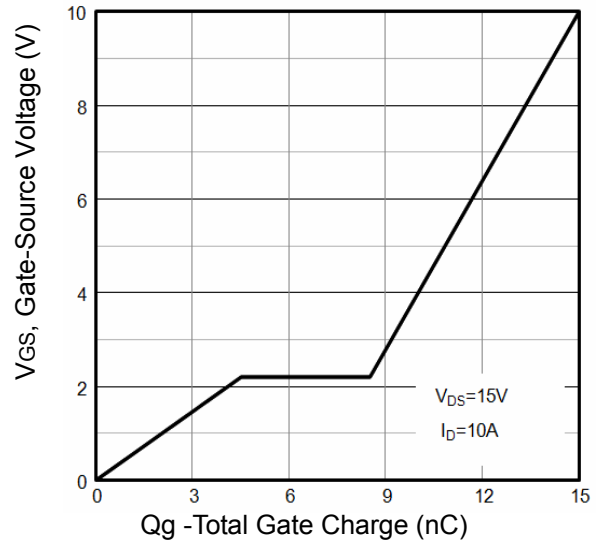


Fig8. Typical Gate Charge Vs.Gate-Source

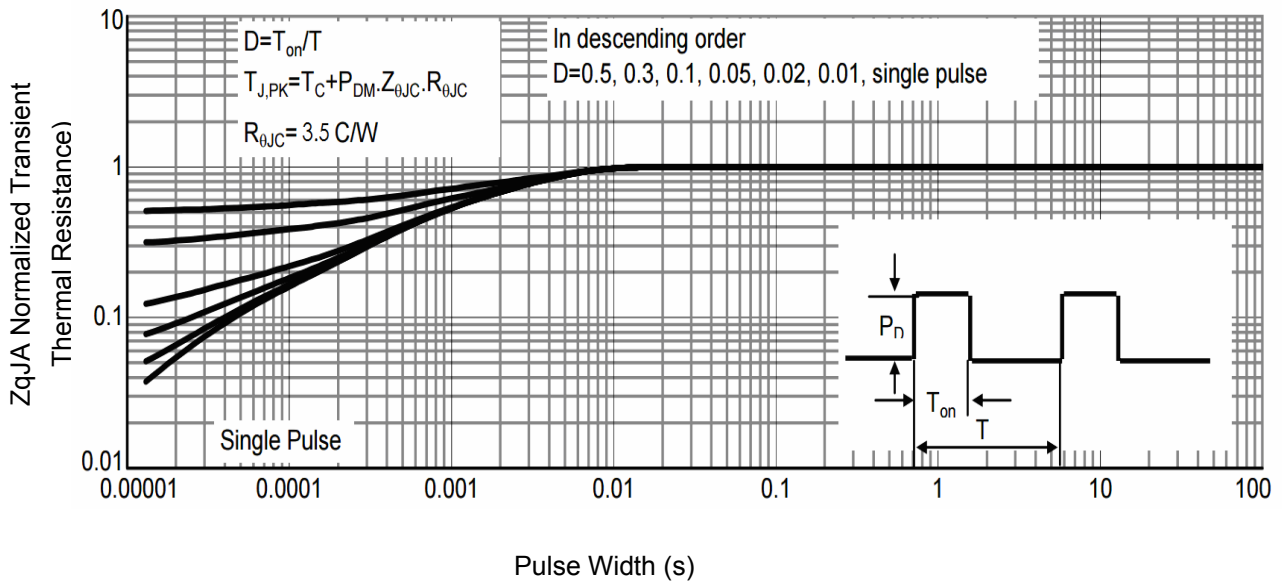


Fig 9 .Normalized Maximum Transient Thermal Impedance

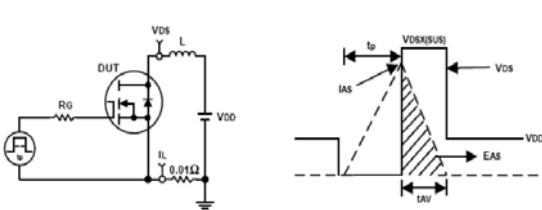


Fig10. Unclamped Inductive Test Circuit and waveforms

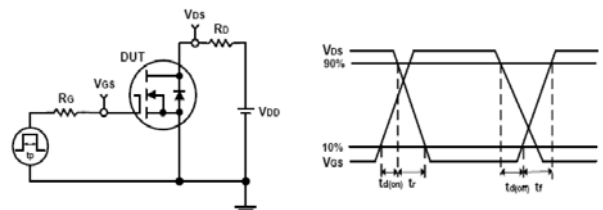
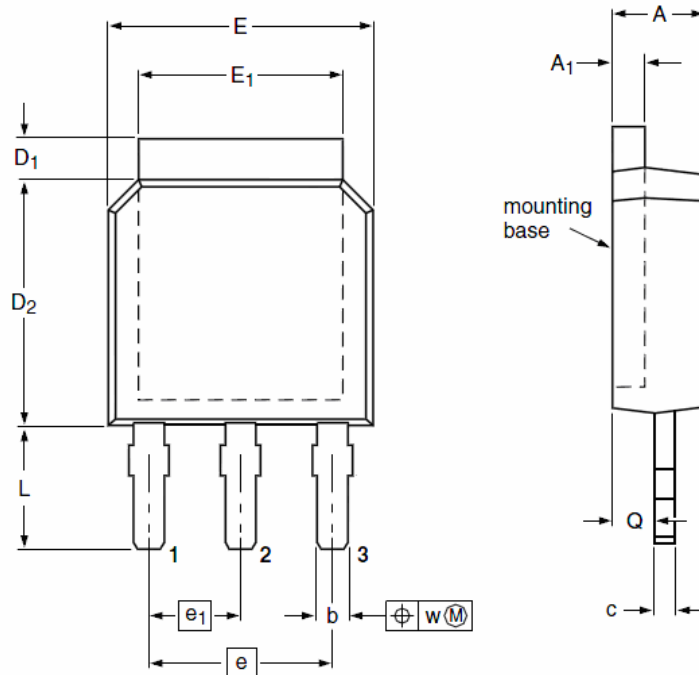


Fig11. Switching Time Test Circuit and waveforms

TO-251-S Package Outline Data



**DIMENSIONS** ( unit : mm )

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.10	2.30	2.50	A <sub>1</sub>	0.40	0.48	0.60
b	0.65	0.75	0.85	c	0.40	0.50	0.60
D <sub>1</sub>	0.65	0.90	1.20	D <sub>2</sub>	5.90	6.08	6.25
E	6.35	6.58	6.80	E <sub>1</sub>	5.10	5.28	5.50
e	--	2.28	--	e <sub>1</sub>	--	4.57	--
L	4.75	5.15	5.85	Q	0.80	0.90	1.08
w	--	0.20	--				

**Customer Service**

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