



VIS30040

30V N-Channel Power Trench MOSFET

General Description

- Trench Power MOSFET Technology
- Low $R_{DS(ON)}$
- Optimized for High Reliable Switch Application
- High Current Capability
- RoHS and Halogen-Free Compliant

Applications

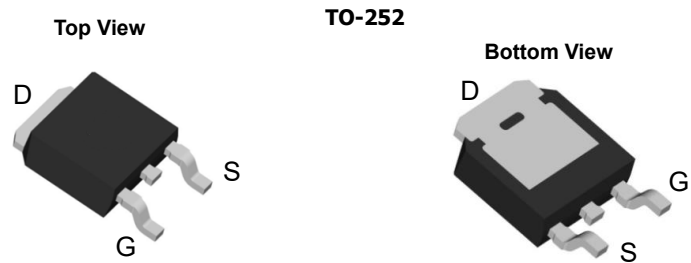
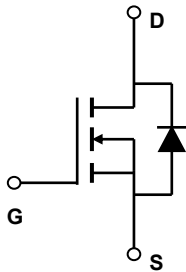
- Motor Drive
- Load Switch
- Battery Protection
- General DC/DC Converters

Product Summary

V_{DS}		30V
I_D	(at $V_{GS}=10V$)	90A
$R_{DS(ON)}$	(at $V_{GS}=10V$, typ)	4.1m Ω
$R_{DS(ON)}$	(at $V_{GS}=4.5V$, typ)	5.4m Ω

100% UIS Tested

100% RG Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
VIS30040	TO-252	Tape & Reel	2500

Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ⁽⁵⁾	I_D	$T_C=25^\circ C$	90
		$T_C=100^\circ C$	66
Pulsed Drain Current ⁽³⁾	I_{DM}	230	A
Continuous Drain Current	I_{DSM}	$T_A=25^\circ C$	30
		$T_A=100^\circ C$	19
Avalanche Current ⁽³⁾	I_{AS}	33.3	A
Avalanche Energy $L=0.1mH$ ⁽³⁾	E_{AS}	55	mJ
Power Dissipation ⁽²⁾	P_D	$T_C=25^\circ C$	83.3
		$T_C=100^\circ C$	33.3
Power Dissipation ⁽¹⁾	P_{DSM}	$T_A=25^\circ C$	6.25
		$T_A=100^\circ C$	2.5
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	16	20	$^\circ C/W$
Maximum Junction-to-Ambient ^(1,4)		41	50	$^\circ C/W$
Maximum Junction-to-Case	$R_{\theta JC}$	1.2	1.5	$^\circ C/W$



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Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.4	1.8	2.2	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125° V _{GS} =4.5V, I _D =20A		4.1 5.8 5.4	4.9 7.3	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		71		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.71		V
I _S	Maximum Body-Diode Continuous Current				81	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		2366		pF
C _{oss}	Output Capacitance			350		pF
C _{rss}	Reverse Transfer Capacitance			225		pF
R _g	Gate resistance	f=1MHz		0.6		Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		45.5		nC
Q _g (4.5V)	Total Gate Charge			21.6		nC
Q _{gs}	Gate Source Charge			9.7		nC
Q _{gd}	Gate Drain Charge			9.4		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		12.3		ns
t _r	Turn-On Rise Time			9.4		ns
t _{D(off)}	Turn-Off Delay Time			28.5		ns
t _f	Turn-Off Fall Time			9.8		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=200A/μs		6.8		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=200A/μs		10.2		nC

- 1) R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The Power dissipation P_{DSM} is based on R_{θJA} ≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- 2) The power dissipation P_D is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- 3) Single pulse width limited by junction temperature T_{J(MAX)}=150°C.
- 4) R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.
- 5) The maximum current rating is package limited.



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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

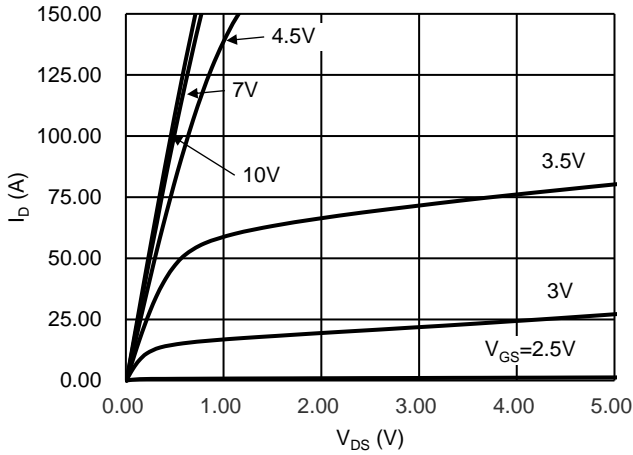


Fig 1. Typical Output Characteristics

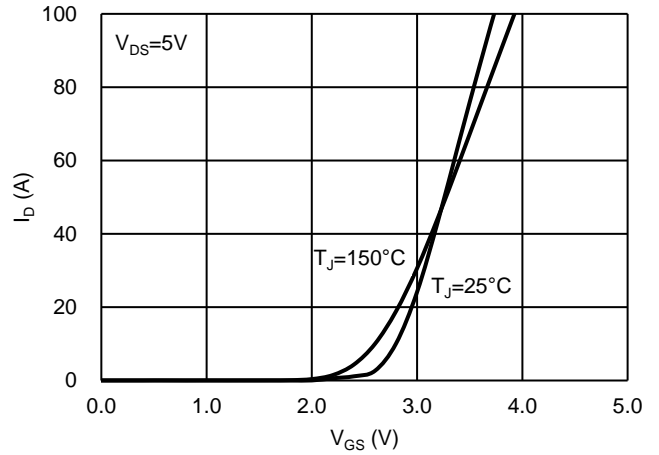


Fig 2. Typical Transfer Characteristics

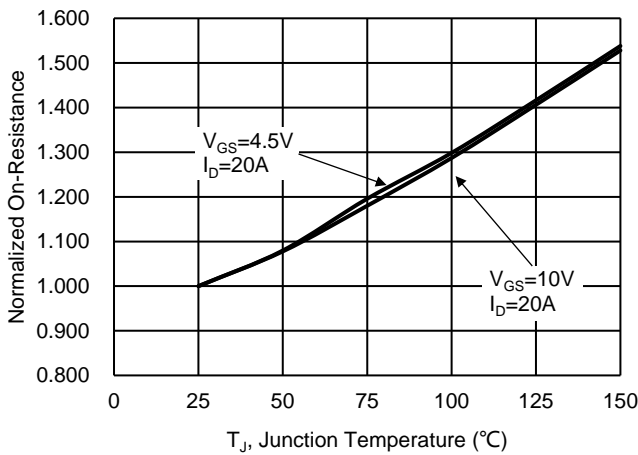


Fig 3. Normalized On-Resistance vs. Temperature

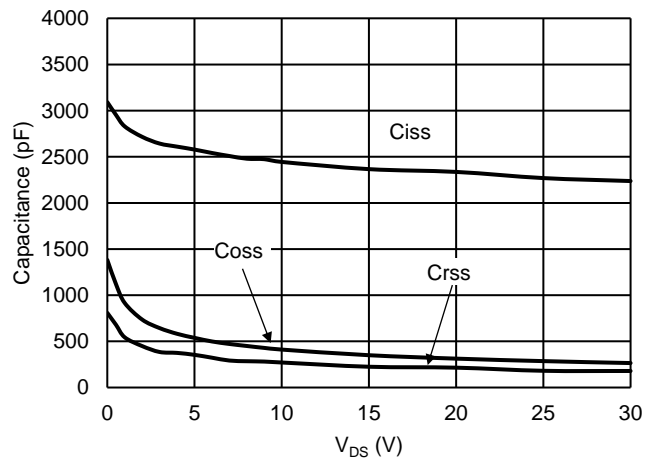


Fig 4. Typical Capacitance vs. V_{DS}

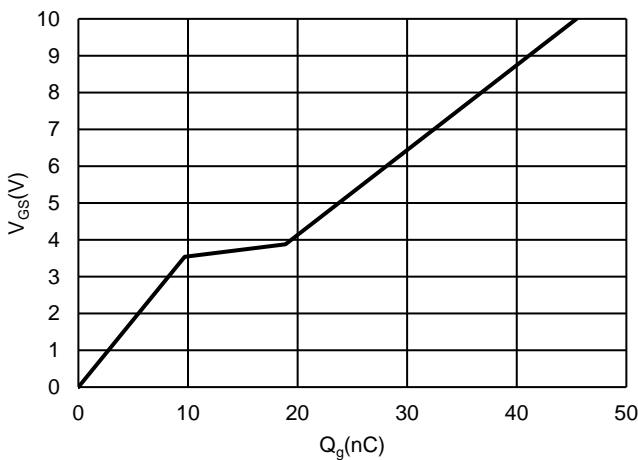


Fig 5. Typical Gate Charge vs. V_{GS}

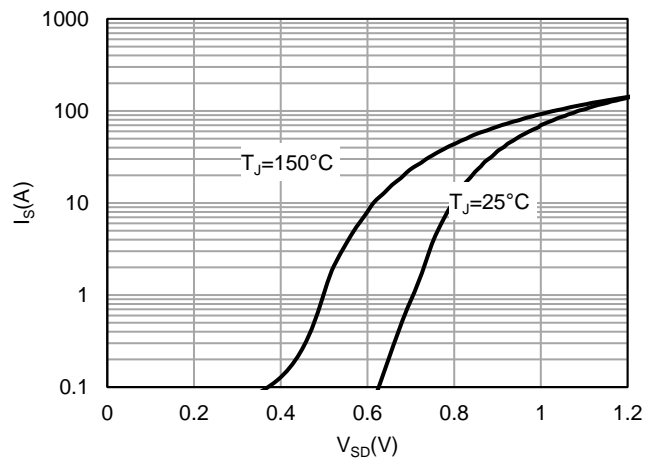


Fig 6. Typical Source-Drain Diode Forward Voltage



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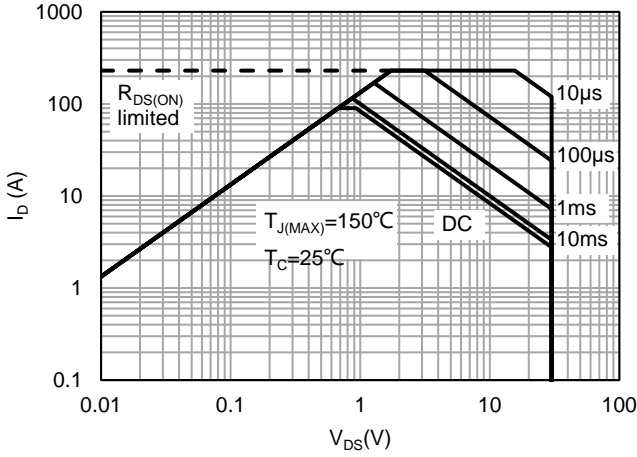


Fig 7. Maximum Safe Operating Area

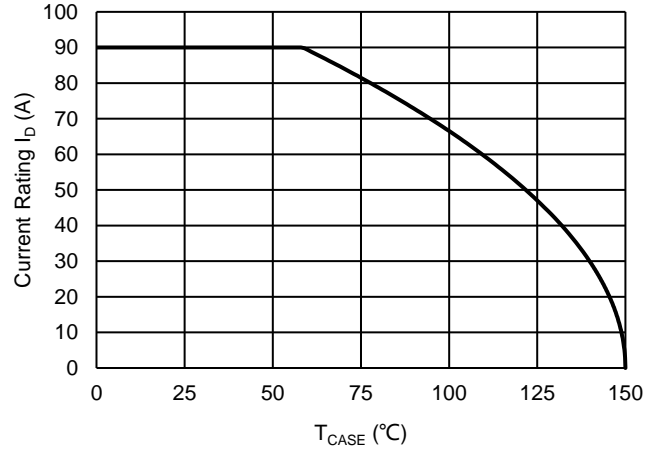


Fig 8. Maximum Drain Current vs. Case Temperature

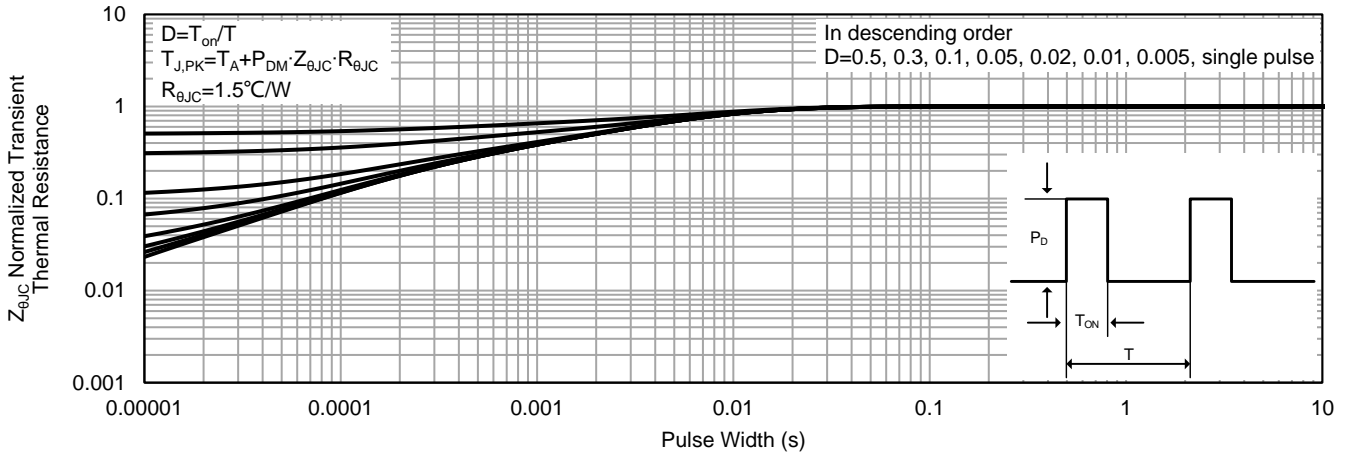


Fig 9. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

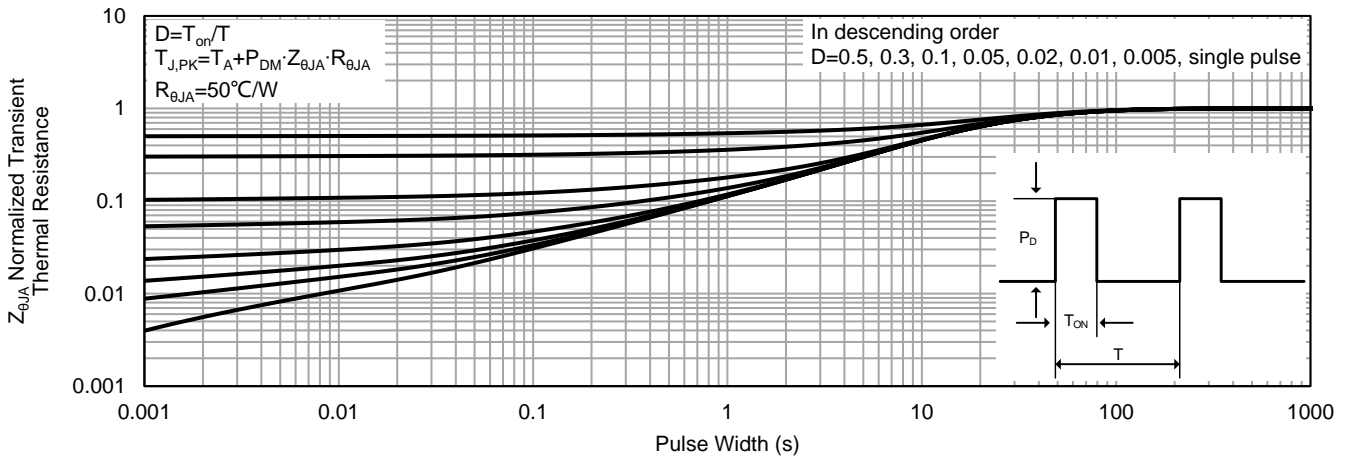


Fig 10. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient



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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

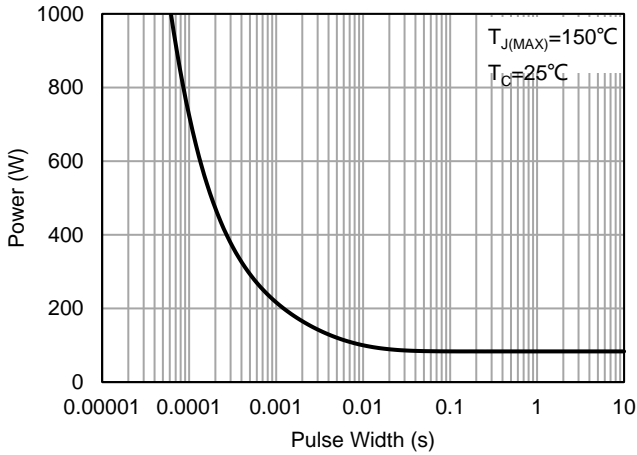


Fig 11. Single Pulse Power Rating Junction-to-Case

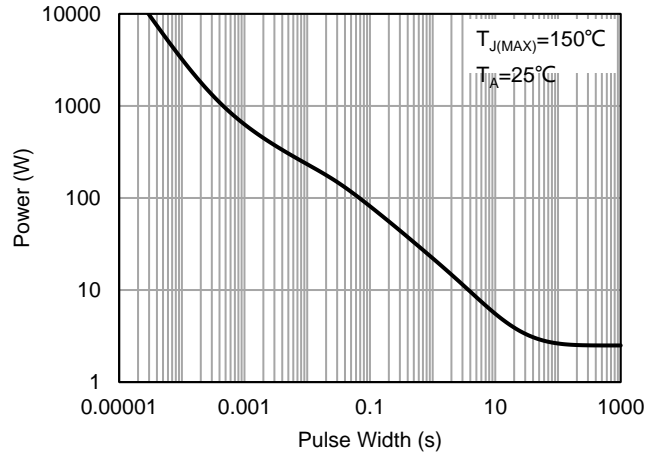


Fig 12. Single Pulse Power Rating Junction-to-Ambient

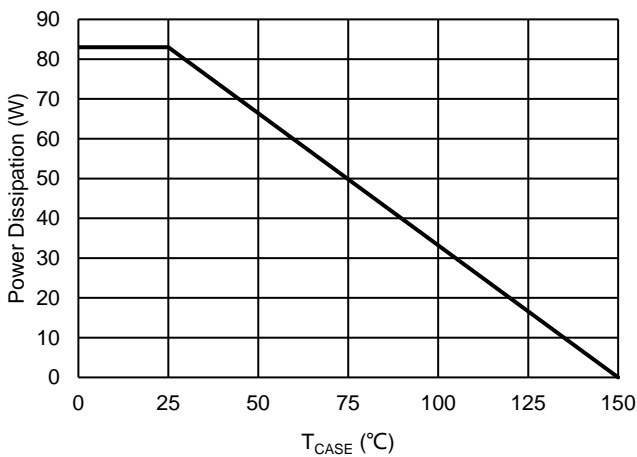


Fig 13. Maximum Power Rating vs. Temperature

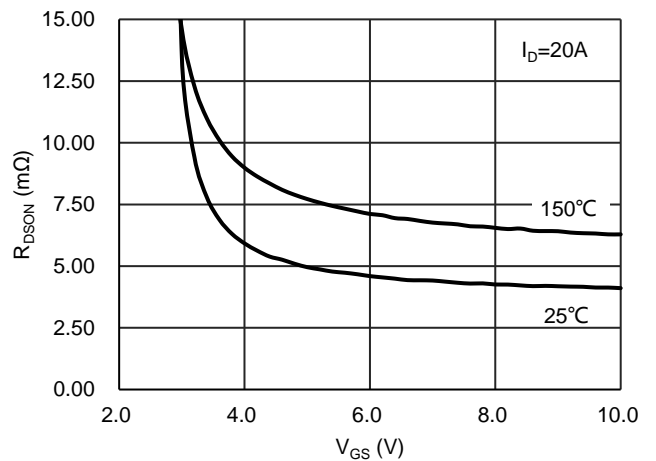


Fig 14. On-Resistance vs. V_{GS}

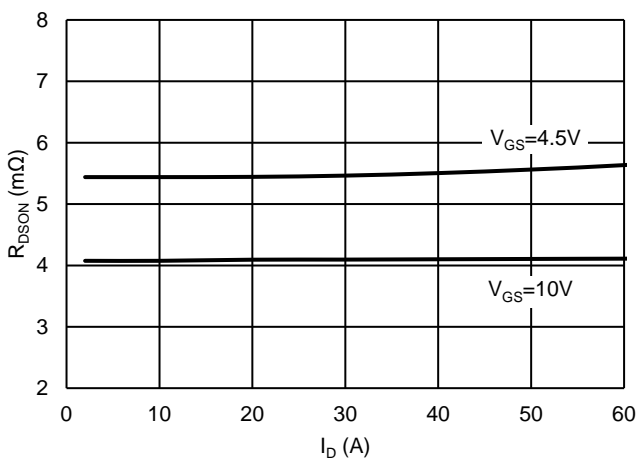


Fig 15. On-Resistance vs. Drain Current

TEST CIRCUIT

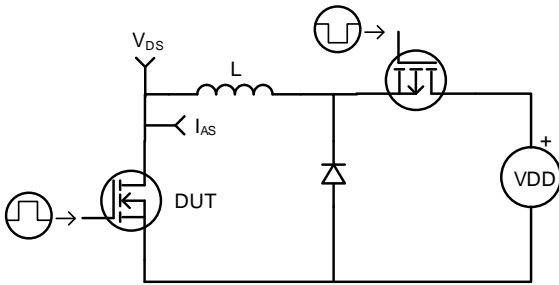


Fig16. Unclamped Inductive Test Circuit

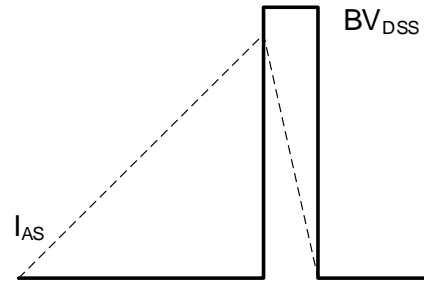


Fig17. Unclamped Inductive Waveform

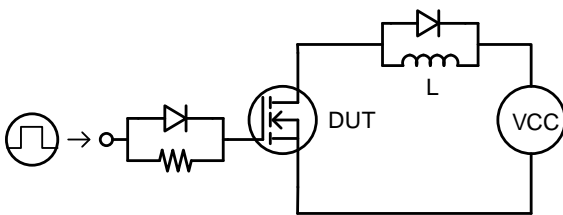


Fig18. Q_g Test Circuit

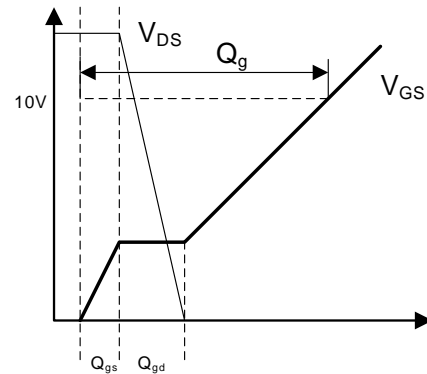


Fig19. Q_g Waveform

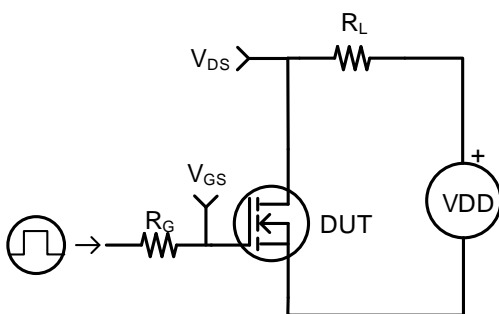


Fig18. Resistive Switching Test Circuit

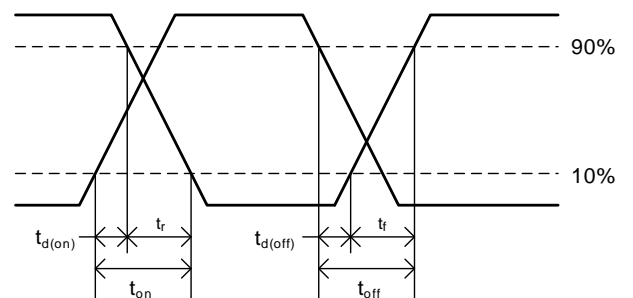


Fig19. Switching Time Waveform

TEST CIRCUIT

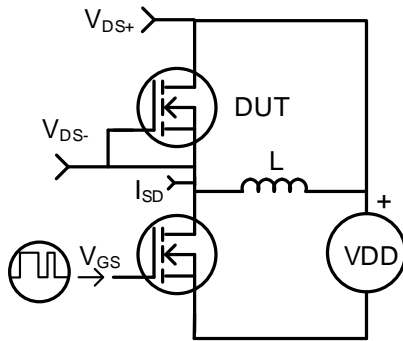


Fig20. Diode Recovery Test Circuit

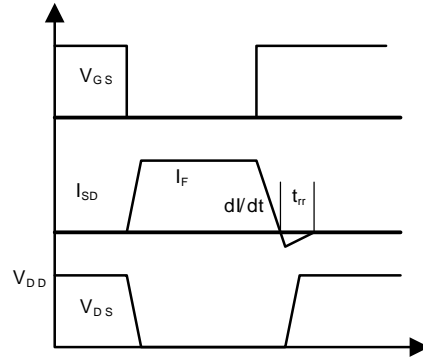
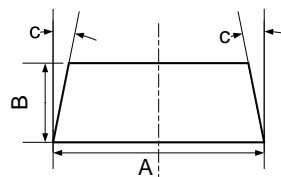
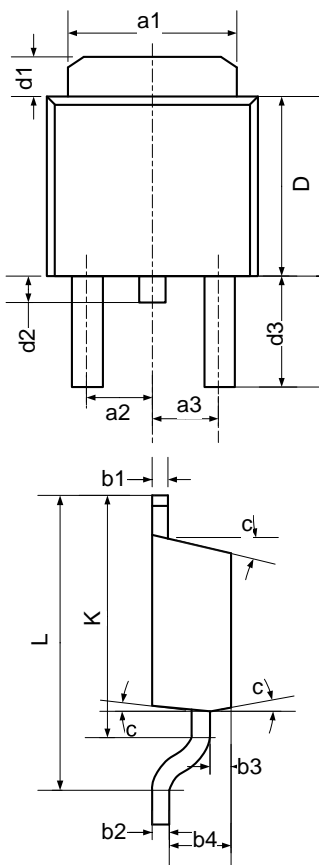


Fig21. Diode Recovery Test Waveform

TO-252 OUTLINE



DIM SYMBOL	MILLIMETERS	
	MIN [mm]	MAX [mm]
A	6.50	6.70
B	2.30	2.50
C	5°	
D	5.50	5.70
a1	5.20	5.40
a2	2.30	
a3	2.30	
b1	0.52	
b2	0.50	
b3	0.60	0.80
b4	1.80	2.00
L	8.80	9.20
K	7.00	7.40
d1	1.15	1.35
d2	0.45	0.85
d3	2.45	2.85

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