

General Description

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

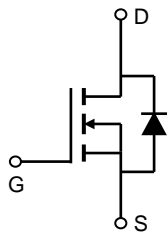
Applications

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

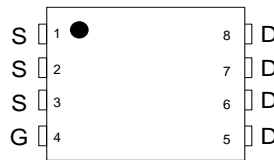
Product Summary

V_{DS}	30V
I_D (at $V_{GS}=10V$)	150A
$R_{DS(ON)}$ (at $V_{GS}=10V$, typ)	1.7m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$, typ)	2.1m Ω

100% UIS Tested
100% R_G Tested

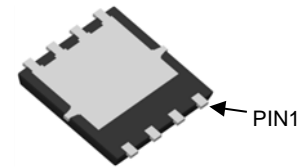


Top View



DFN5X6

Bottom View



Orderable Part Number

VIS30019

Package Type

DFN 5x6

Form

Tape & Reel

Minimum Order Quantity

5000

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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	$T_C=25^\circ\text{C}$	150
		$T_C=100^\circ\text{C}$	104
Pulsed Drain Current ⁽³⁾	I_{DM}	288	A
Continuous Drain Current	I_{DSM}	$T_A=25^\circ\text{C}$	51
		$T_A=70^\circ\text{C}$	41
Avalanche Current ⁽³⁾	I_{AS}	65	A
Avalanche energy $L=0.1\text{mH}$ ⁽³⁾	E_{AS}	211	mJ
Power Dissipation ⁽²⁾	P_D	$T_C=25^\circ\text{C}$	83.3
		$T_C=100^\circ\text{C}$	33.3
Power Dissipation ⁽¹⁾	P_{DSM}	$T_A=25^\circ\text{C}$	8
		$T_A=70^\circ\text{C}$	5.1
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ⁽¹⁾ $t \leq 10\text{s}$	$R_{\theta JA}$	13	15.6	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^(1,4) Steady-State		35	42	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case Steady-State	$R_{\theta JC}$	1.2	1.5	$^\circ\text{C}/\text{W}$



VIS30019

30V N-Channel Power Trench MOSFET

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\text{mA}, V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\text{mA}$	1.4	1.8	2.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=20\text{A}$ $T_J=125^\circ\text{C}$		1.7	2.1	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=20\text{A}$		2.1	2.6	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=20\text{A}$		120		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.69		V
I_S	Maximum Body-Diode Continuous Current				110	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		5969		pF
C_{oss}	Output Capacitance			805		pF
C_{rss}	Reverse Transfer Capacitance			442		pF
R_g	Gate resistance	$f=1\text{MHz}$		0.7		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=20\text{A}$		104		nC
$Q_g(4.5\text{V})$	Total Gate Charge			51		nC
Q_{gs}	Gate Source Charge			15		nC
Q_{gd}	Gate Drain Charge			18		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=15\text{V},$ $R_L=0.75\text{W}, R_{GEN}=3\text{W}$		8.6		ns
t_r	Turn-On Rise Time			9.6		ns
$t_{D(off)}$	Turn-Off Delay Time			58.4		ns
t_f	Turn-Off Fall Time			22.8		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}, di/dt=500\text{A/ms}$		28.7		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}, di/dt=500\text{A/ms}$		19.5		nC

- 1) $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA} \leq 10\text{s}$ 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 $T_{J(MAX)}=150^\circ\text{C}$, 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 $T_{J(MAX)}=150^\circ\text{C}$.
- 4) $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
- 5) The maximum current rating is package limited.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

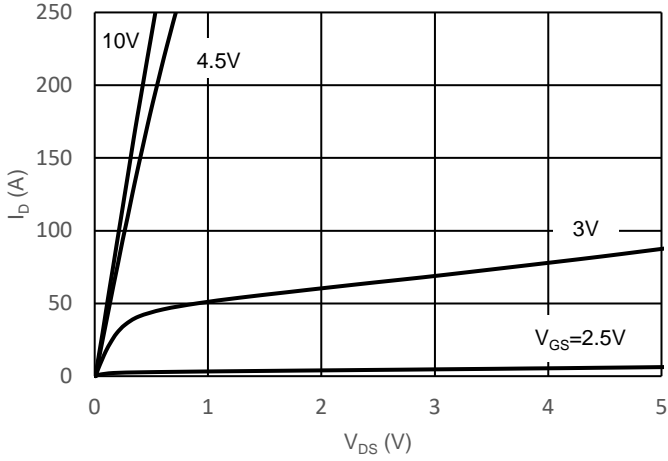


Fig 1. Typical Output Characteristics

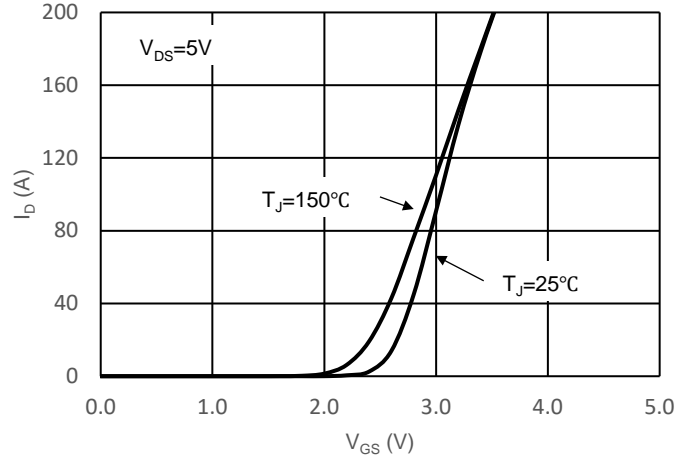


Fig 2. Typical Transfer Characteristics

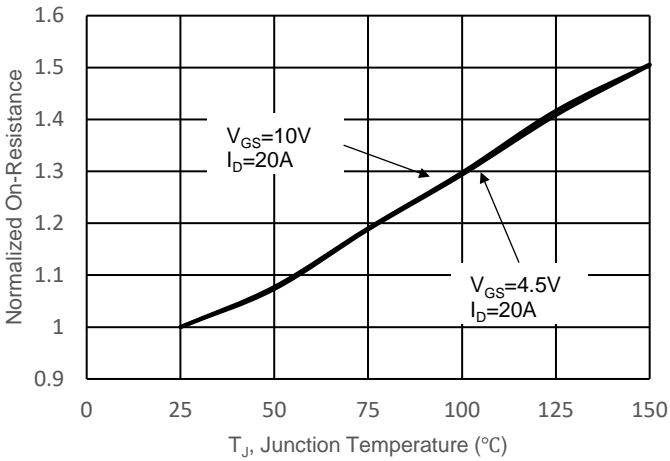


Fig 3. Normalized On-Resistance vs. Temperature

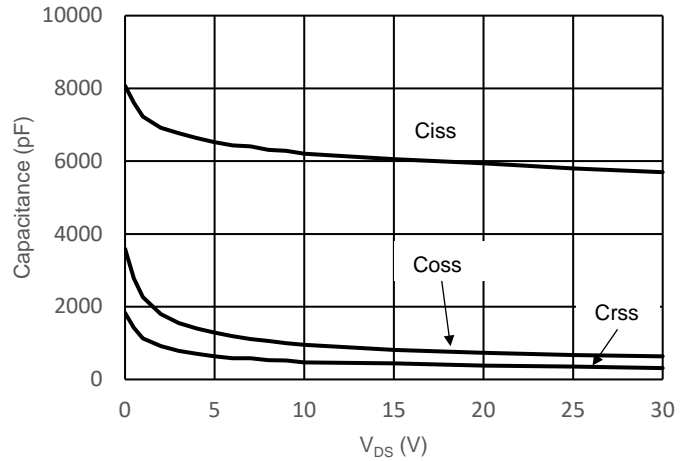


Fig 4. Typical Capacitance vs. V_{DS}

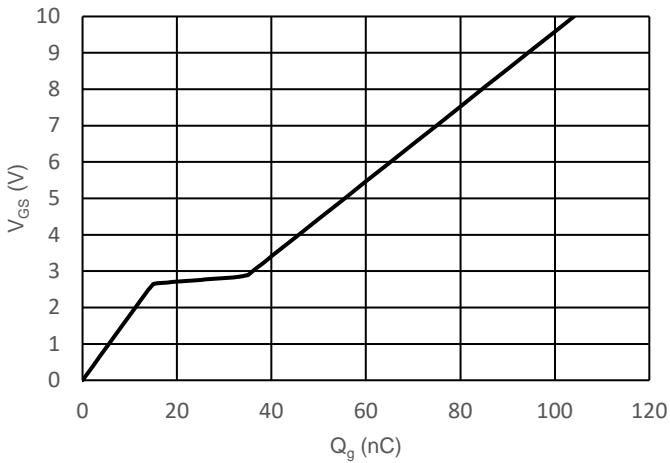


Fig 5. Typical Gate Charge vs. V_{GS}

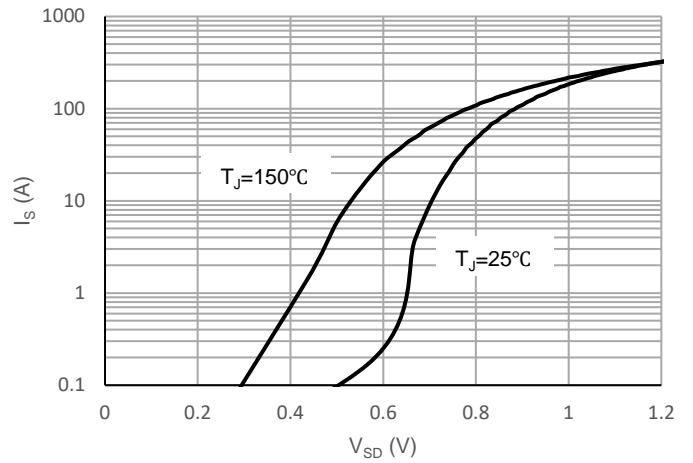


Fig 6. Typical Source-Drain Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

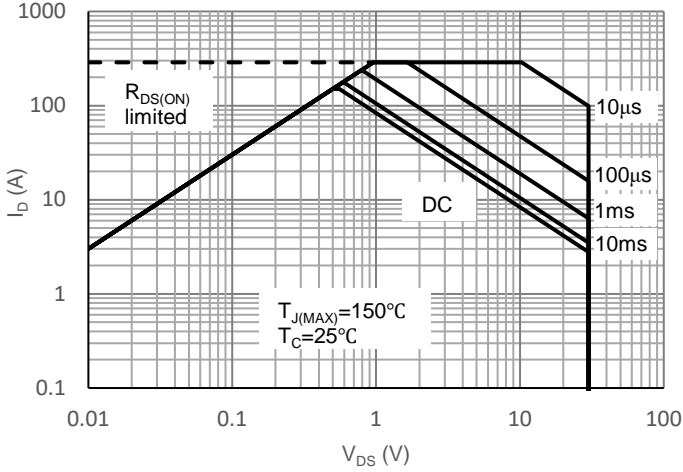


Fig 7. Maximum Safe Operating Area

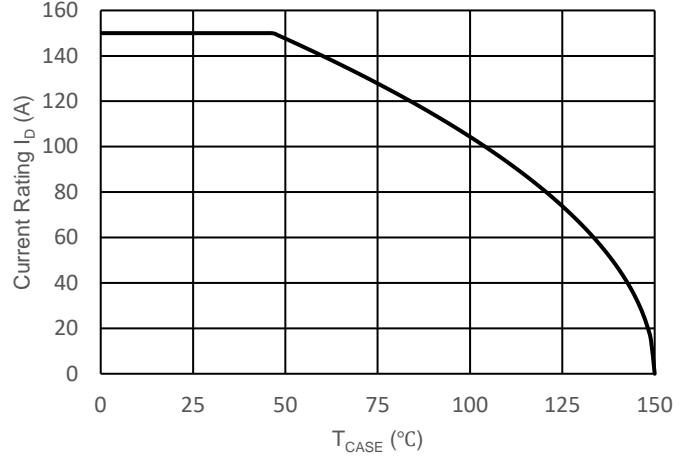


Fig 8. Maximum Drain Current vs. Case Temperature

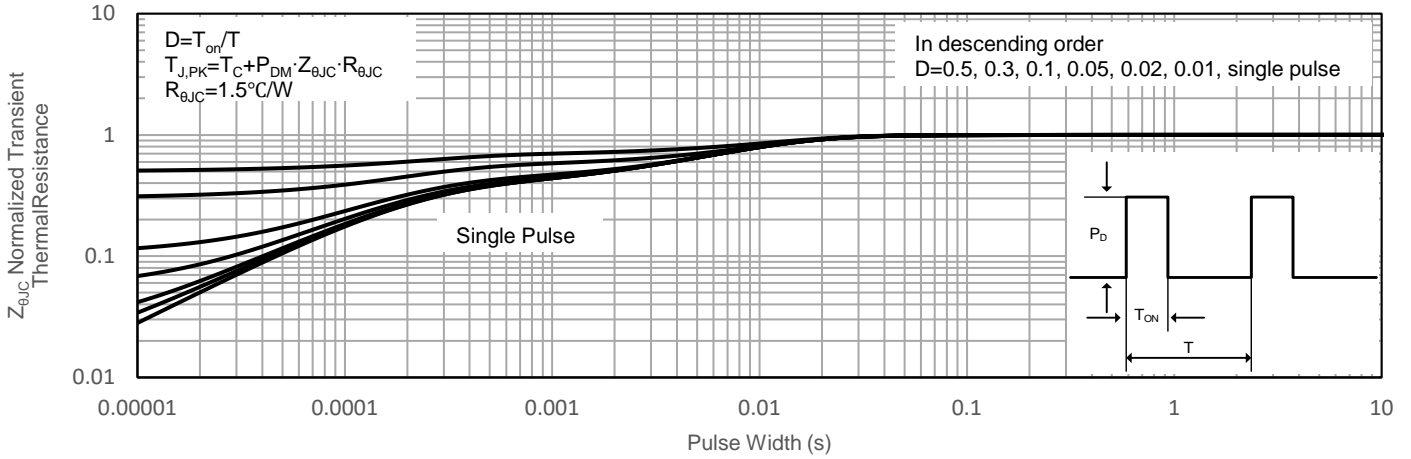


Fig 9. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

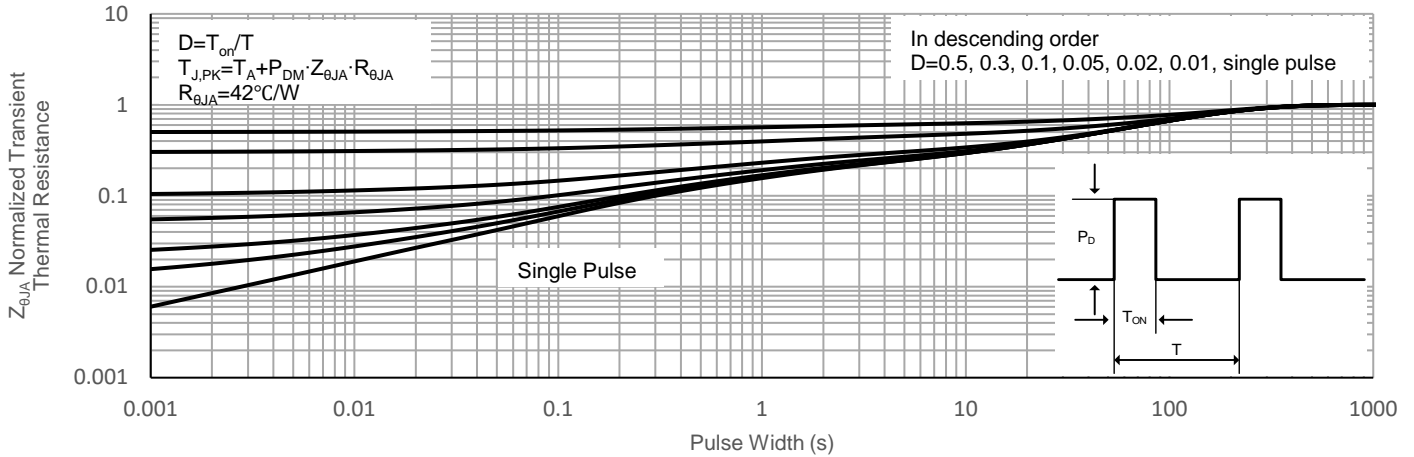


Fig 10. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

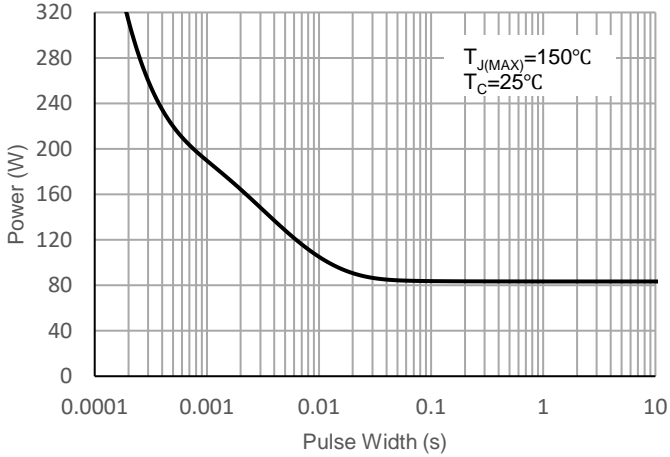


Fig 11. Single Pulse Power Rating Junction-to-Case

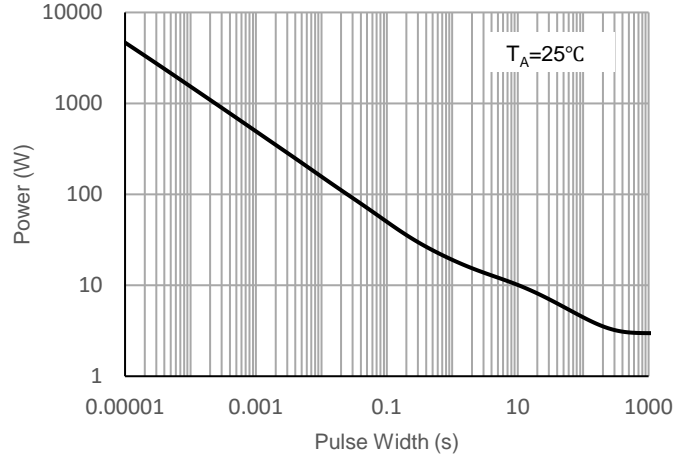


Fig 12. Single Pulse Power Rating Junction-to-Ambient

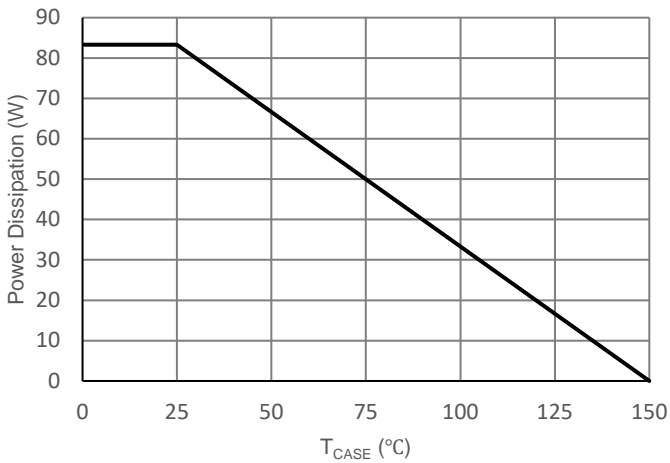


Fig 13. Maximum Power Rating vs. Temperature

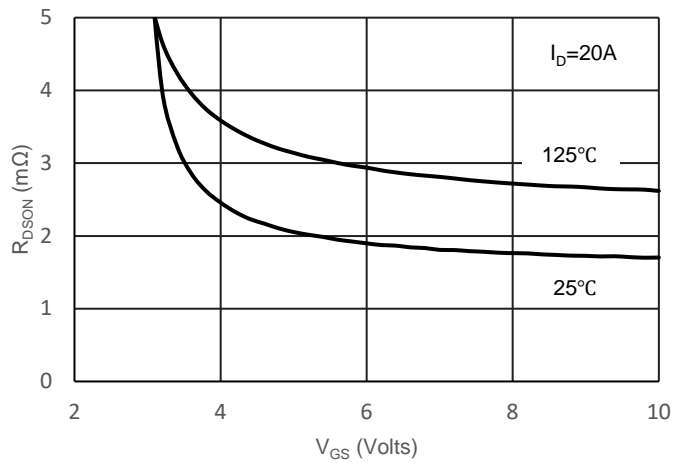


Fig 14. Maximum Power Rating vs. V_{GS}

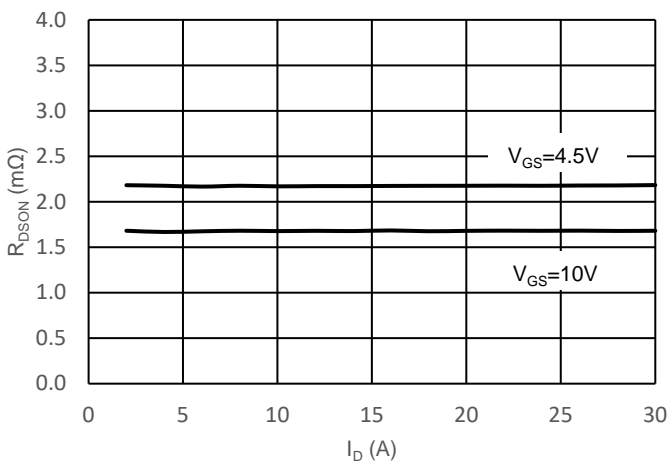


Fig 15. On-Resistance vs. Drain Current

TEST CIRCUIT

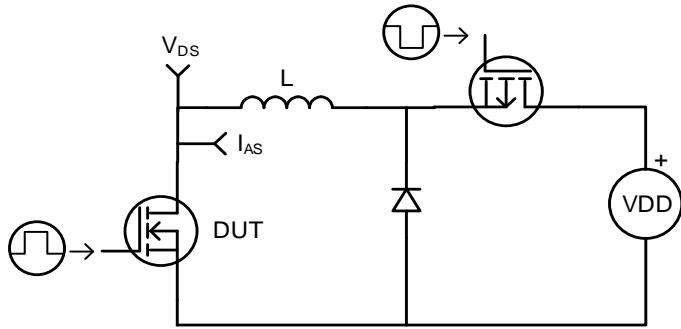


Fig16. Unclamped Inductive Test Circuit

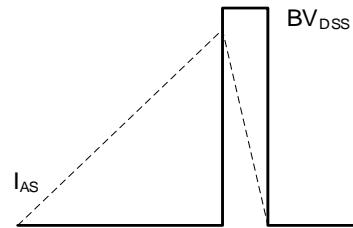


Fig17. Unclamped Inductive Waveform

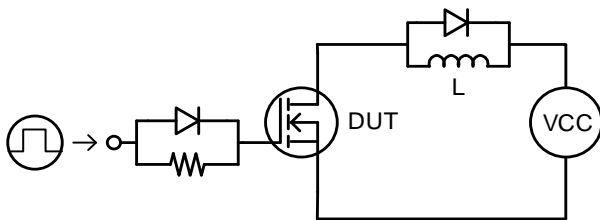


Fig18. Q_g Test Circuit

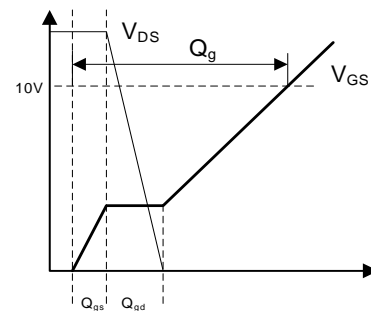


Fig19. Q_g Waveform

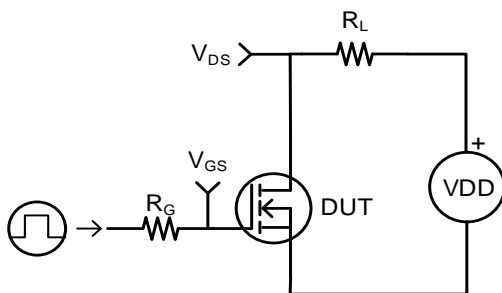


Fig18. Resistive Switching Test Circuit

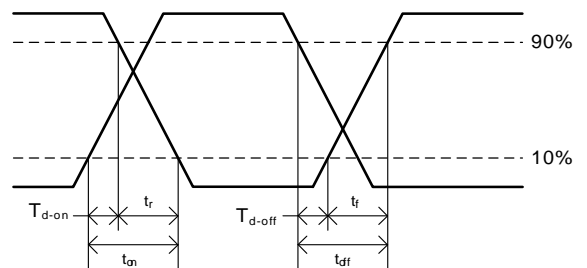


Fig19. Switching Time Waveform

TEST CIRCUIT

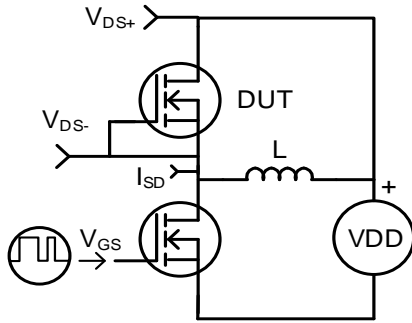


Fig20. Diode Recovery Test Circuit

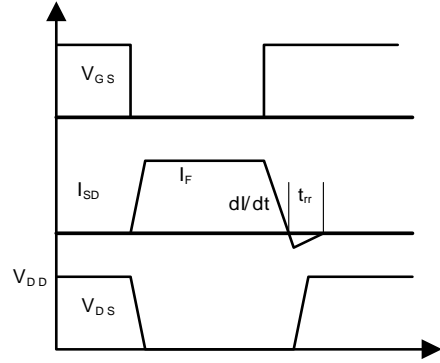
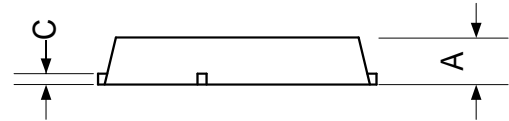
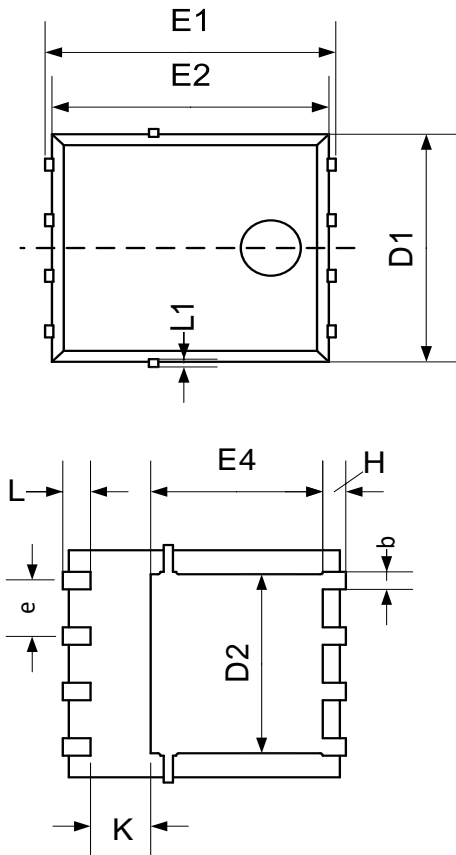


Fig21. Diode Recovery Test Waveform

DFN5x6 OUTLINE



SYMBOL	DIM	MILLIMETERS	
		MIN [mm]	MAX [mm]
A		1.0	1.2
b		0.3	0.5
C		0.23	0.27
D1		5.0	5.4
D2		3.8	4.25
e		1.17	1.37
E1		5.95	6.35
E2		5.66	6.06
E4		3.52	3.92
H		0.4	0.6
K		1.15	1.45
L		0.3	0.7
L1		0	0.12