VIS30010

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

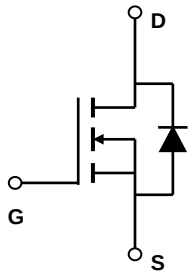
- Motor Drive
- Load Switch
- Battery Protection
- General DC/DC Converters

Product Summary

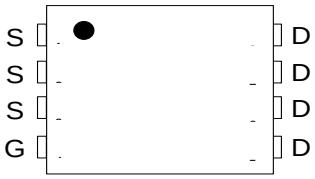
V_{DS}		30V
I_D	(at V_{GS}=10V)	240A
$R_{DS(ON)}$	(at V_{GS}=10V, typ)	0.96mΩ
$R_{DS(ON)}$	(at V_{GS}=4.5V, typ)	1.25mΩ

100% UIS Tested

100% RG Tested

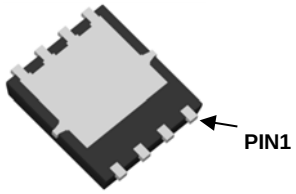


Top View



DFN5X6

Bottom View



Orderable Part Number	Package Type	Form	Minimum Order Quantity
VIS30010	DFN 5×6	Tape & Reel	5000

Absolute Maximum Ratings T_A=25°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]	T_C=25°C	I_D	240	A
	T_C=100°C		150	A
Pulsed Drain Current [3]		I_{DM}	646	A
Continuous Drain Current	T_A=25°C	I_{DSM}	68	A
	T_A=100°C		54	A
Avalanche Current [3]		I_{AS}	85	A
Avalanche Energy L=0.1mH [3]		E_{AS}	361	mJ
Power Dissipation [2]	T_C=25°C	P_D	104	W
	T_C=100°C		41	W
Power Dissipation [1]	T_A=25°C	P_{DSM}	8	W
	T_A=100°C		5.1	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [1]	t ≤ 10s	$R_{\theta JA}$	13	15.6	°C/W
Maximum Junction-to-Ambient [1,4]	Steady-State		34	41	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.95	1.2	°C/W

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			1	µA
		T_J=55°C			5	
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		0.96	1.15	mΩ
		T_J=125°		1.33		
		V_{GS}=4.5V, I_D=20A		1.25	1.50	
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		140		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V		0.66		V
I_S	Maximum Body-Diode Continuous Current				110	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		10354		pF
C_{oss}	Output Capacitance			1414		pF
C_{rss}	Reverse Transfer Capacitance			857		pF
R_g	Gate resistance	f=1MHz		2.0		Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=20A		180.2		nC
Q_g(4.5V)	Total Gate Charge			89.6		nC
Q_{gs}	Gate Source Charge			34.7		nC
Q_{gd}	Gate Drain Charge			35.1		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=0.75Ω, R_{GEN}=3Ω		17.8		ns
t_r	Turn-On Rise Time			11.2		ns
$t_{D(off)}$	Turn-Off DelayTime			136.4		ns
t_f	Turn-Off Fall Time			25.8		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, di/dt=200A/µs		37.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, di/dt=200A/µs		37.6		nC

1) $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤ 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) $R_{\theta JA}$ 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

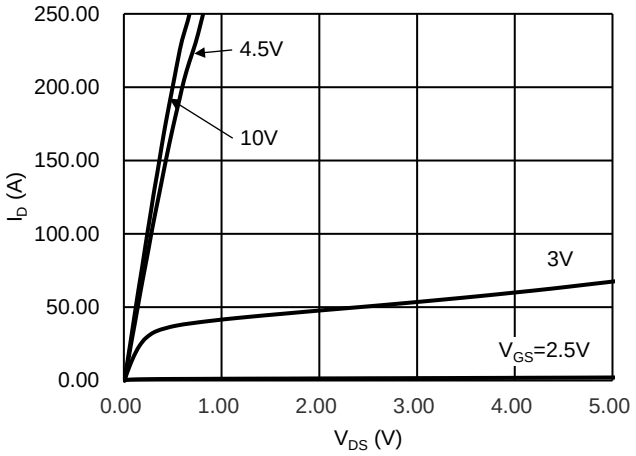


Fig 1. Typical Output Characteristics

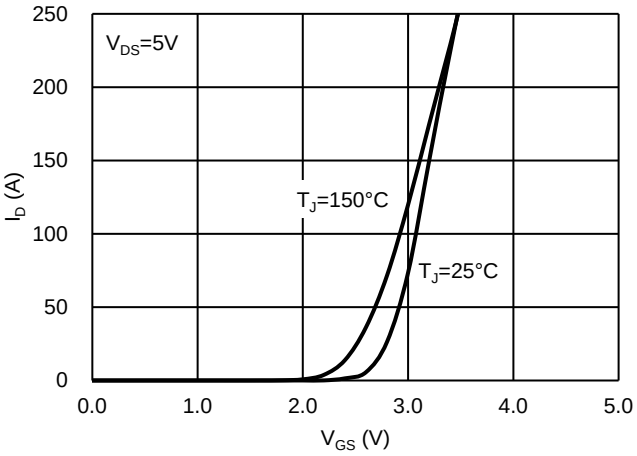


Fig 2. Typical Transfer Characteristics

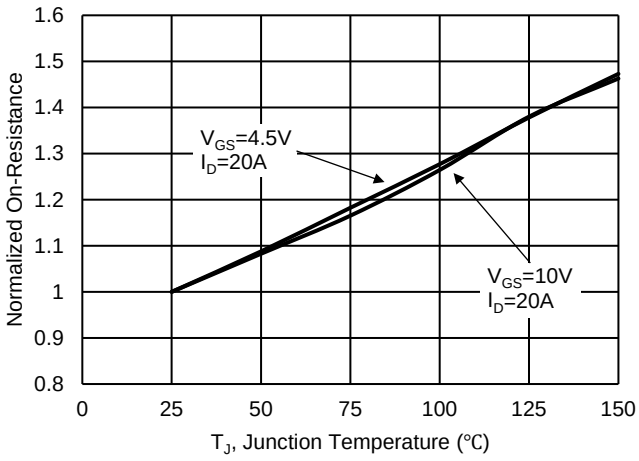


Fig 3. Normalized On-Resistance vs. Temperature

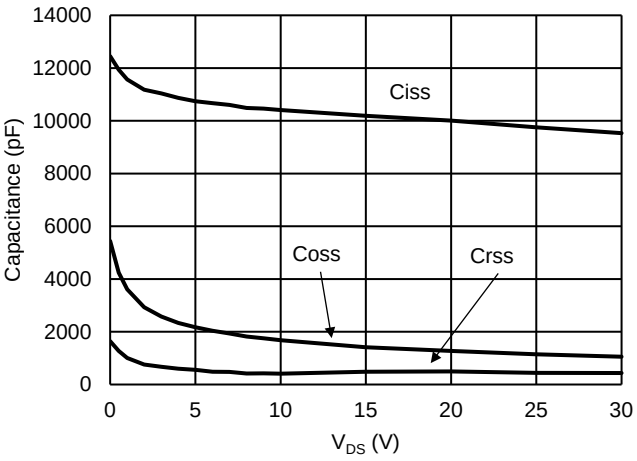


Fig 4. Typical Capacitance vs. V_{DS}

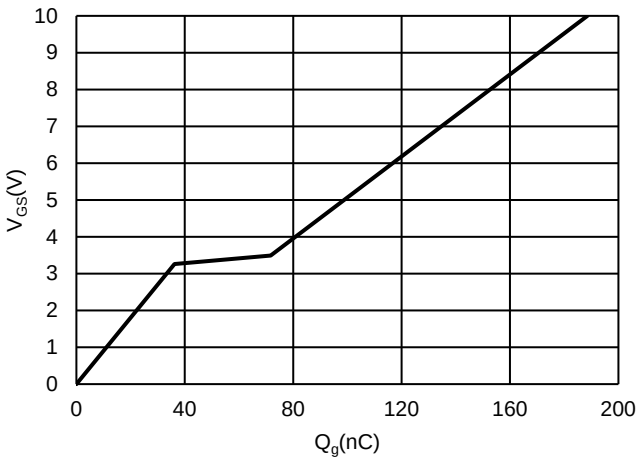


Fig 5. Typical Gate Charge vs. V_{GS}

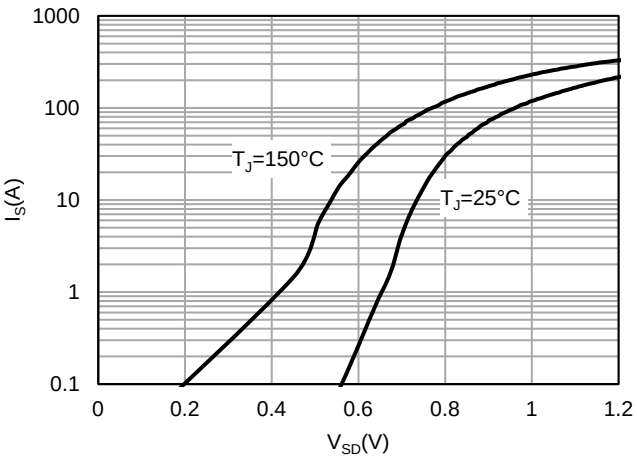


Fig 6. Typical Source-Drain Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

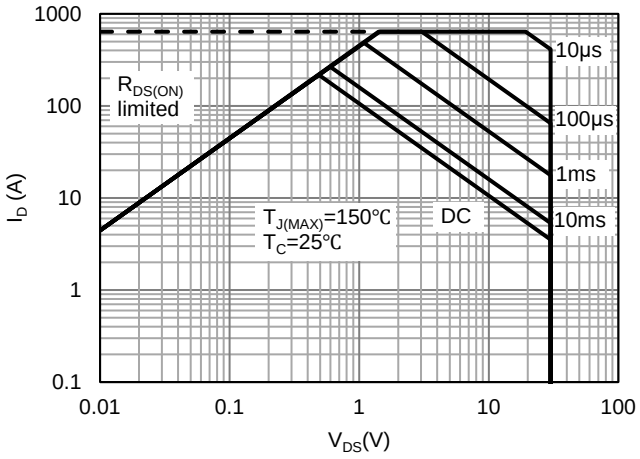


Fig 7. Maximum Safe Operating Area

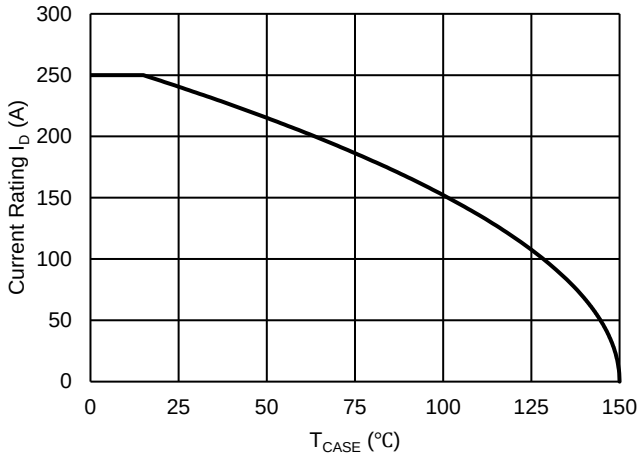


Fig 8. Maximum Drain Current vs. Case Temperature

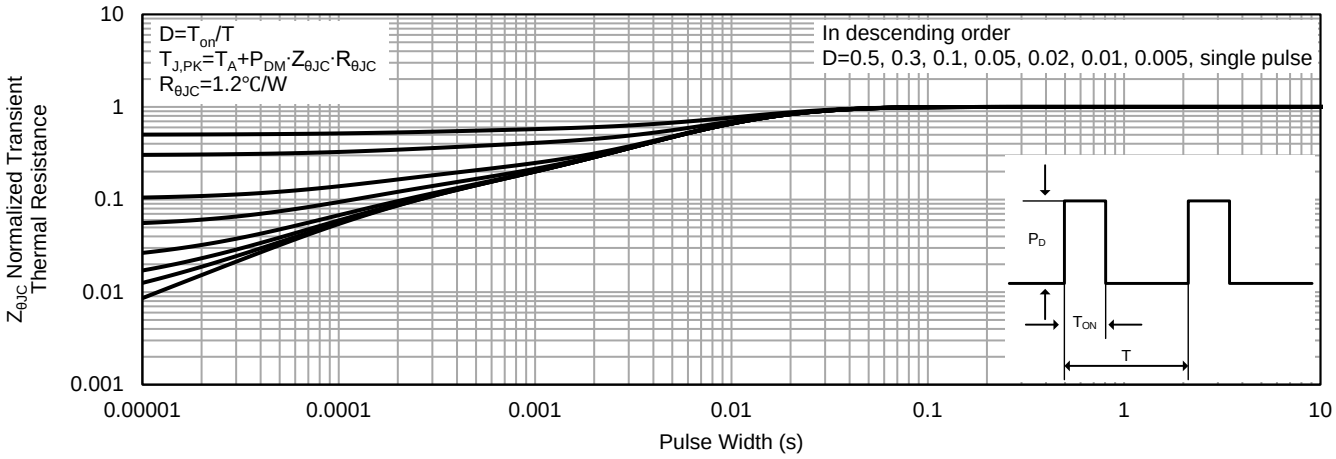


Fig 9. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

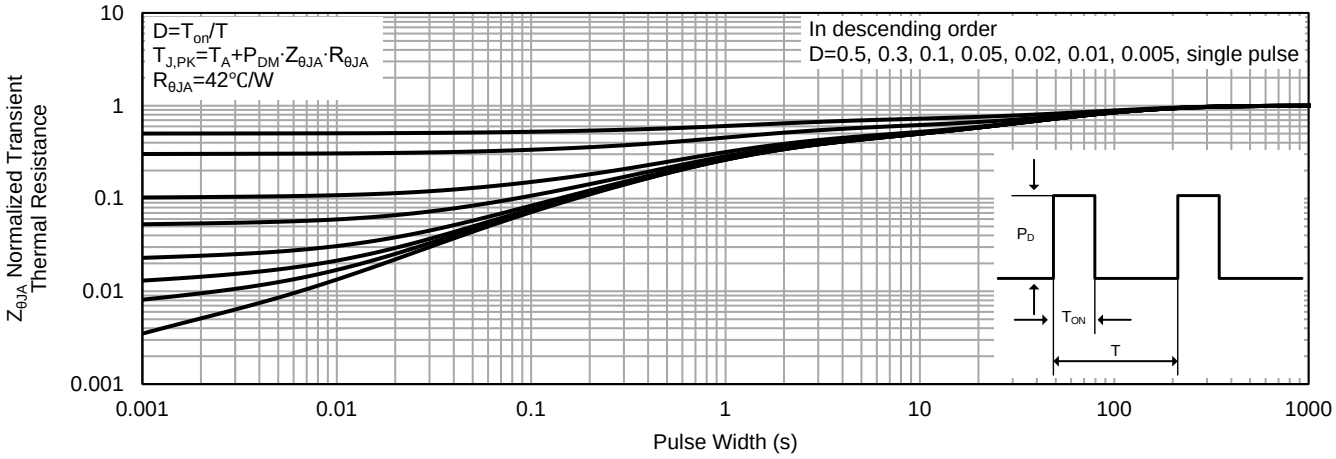


Fig 10. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

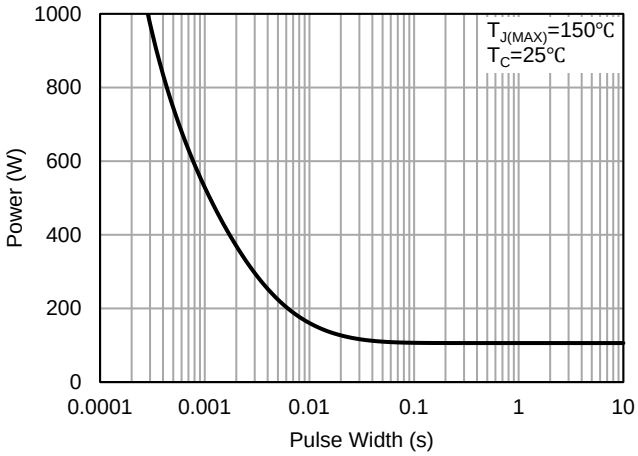


Fig 11. Single Pulse Power Rating Junction-to-Case

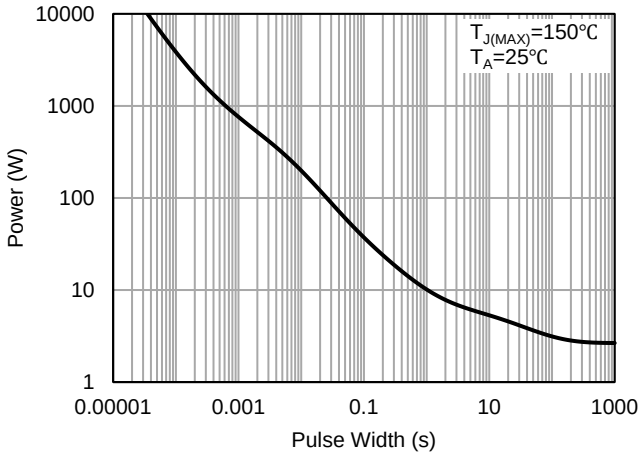


Fig 12. Single Pulse Power Rating Junction-to-Ambient

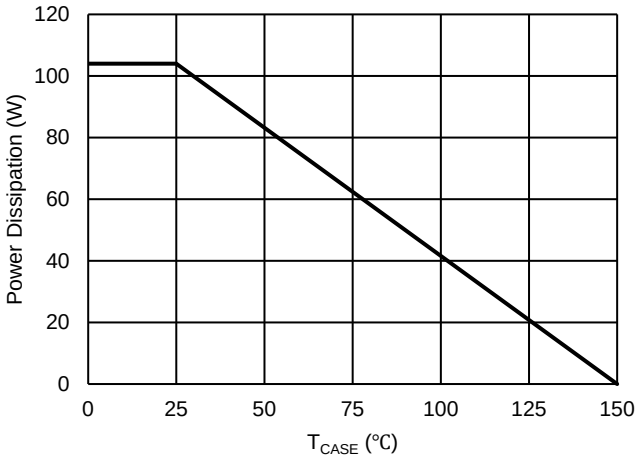


Fig 13. Maximum Power Rating vs. Temperature

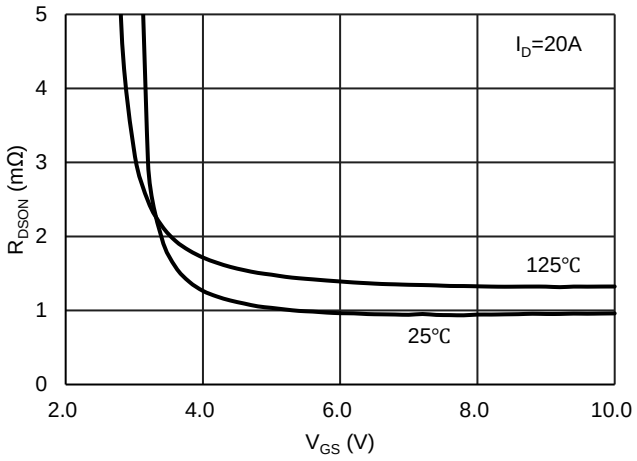


Fig 14. On-Resistance vs. V_{GS}

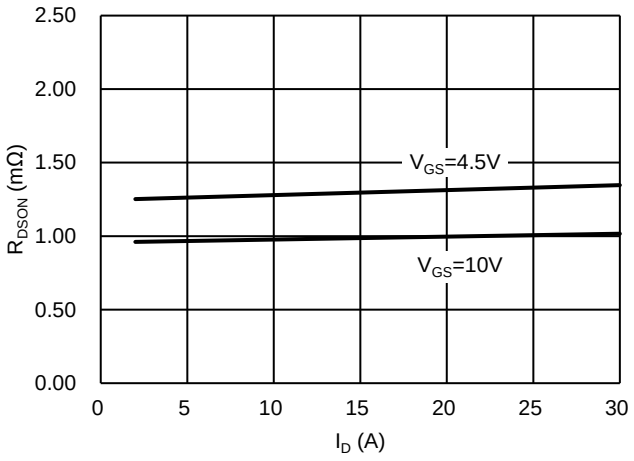


Fig 15. On-Resistance vs. Drain Current

TEST CIRCUIT

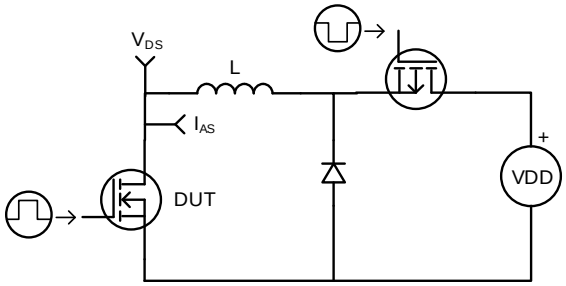


Fig16. Unclamped Inductive Test Circuit

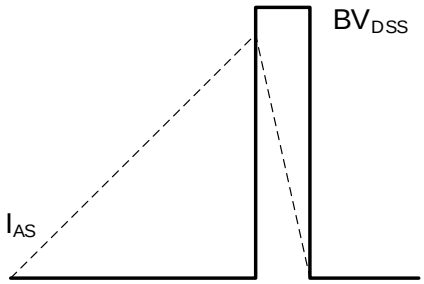


Fig17. Unclamped Inductive Waveform

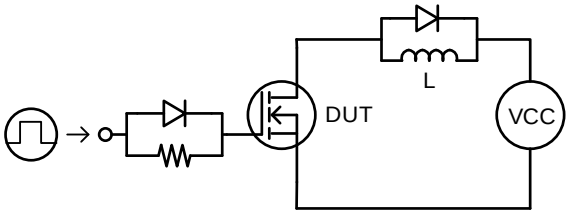


Fig18. Q_g Test Circuit

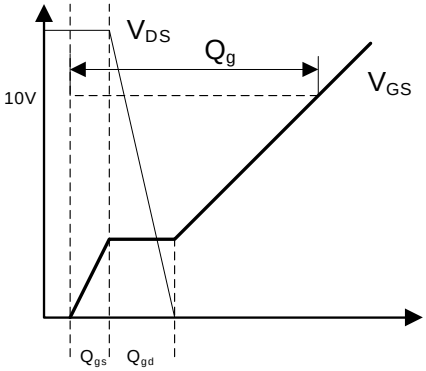


Fig19. Q_g Waveform

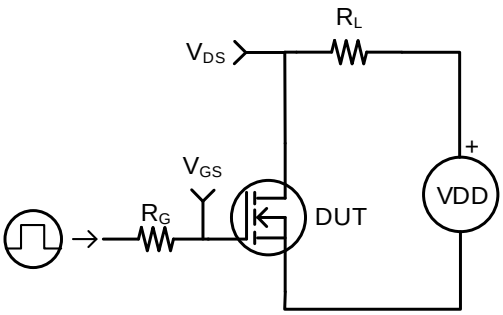


Fig18. Resistive Switching Test Circuit

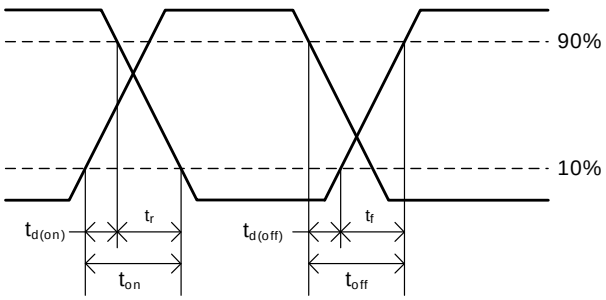


Fig19. Switching Time Waveform

TEST CIRCUIT

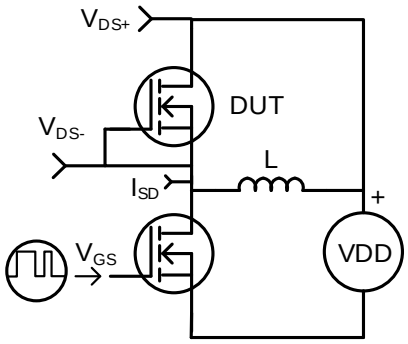


Fig20. Diode Recovery Test Circuit

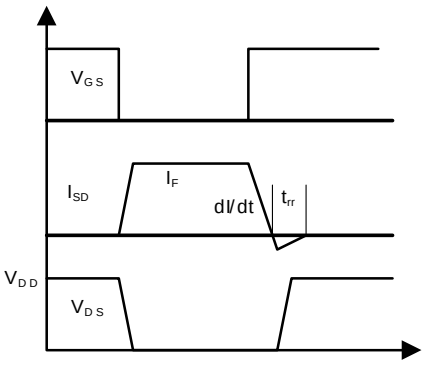
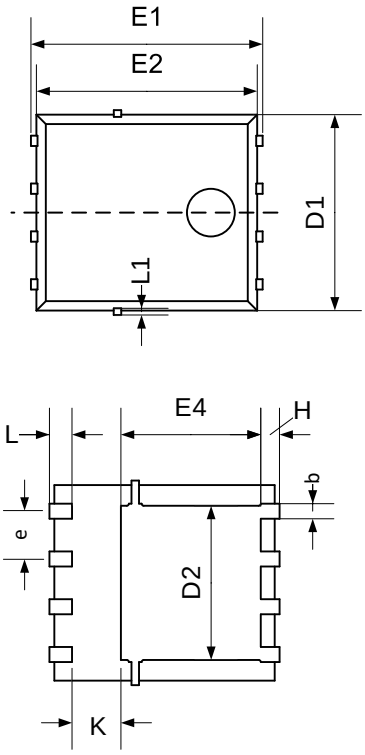
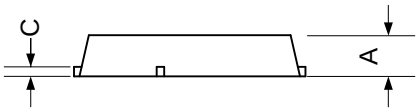


Fig21. Diode Recovery Test Waveform

DFN5×6 OUTLINE





DIM / SYMBOL	MILLIMITERS	
	MIN [mm]	MAX [mm]
A	0.900	1.000
b	0.350	0.450
C	0.254 REF	
D1	4.824	4.976
D2	3.910	4.110
e	1.270 TYP	
E1	5.974	6.126
E2	5.674	5.826
E4	3.375	3.575
H	0.574	0.726
K	1.190	1.390
L	0.559	0.711
L1	0	0.120