



VMDSEMI

# **VFN080N10TA1**

## **Datasheet**

# VFN080N10TA1

## Description

Low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. The low  $V_{th}$  series is specially optimized for synchronous rectification systems with low driving voltage.

## Applications

- Switching voltage regulator
- PD charger
- Motor driver
- DC-DC convertor
- Switched mode power supply

## Features

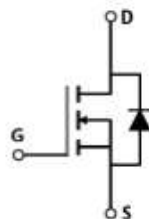
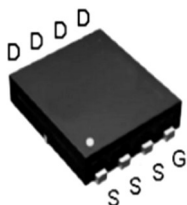
- Low  $R_{DS(ON)}$  and FOM
- Extremely Low Switching Loss
- Excellent Reliability and Stability
- Fast switching and soft recovery

## Key Performance Parameters

Parameter	Value	Unit
$V_{DS,min} @ T_{j,max}$	100	V
$R_{DS(on),max} @ V_{GS}=10V$	8	m $\Omega$
$Q_g$	33.9	nC
$I_{D,pulse}$	210	A

## Packaging and Internal Circuit

Part Name	Package	Marking
VFN080N10TA1	PDFN5*6	VFN080N10TA1



**Absolute Maximum Ratings** ( $T_j=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	100	V
Gate-source voltage	$V_{GS}$	$\pm 20$	V
Continuous drain current <sup>1)</sup> , $T_C=25^{\circ}\text{C}$	$I_D$	70	A
Pulsed drain current <sup>2)</sup> , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	210	A
Continuous diode forward current <sup>1)</sup> , $T_C=25^{\circ}\text{C}$	$I_S$	70	A
Diode pulsed current <sup>2)</sup> , $T_C=25^{\circ}\text{C}$	$I_{S, \text{pulse}}$	210	A
Power dissipation <sup>3)</sup> , $T_C=25^{\circ}\text{C}$	$P_D$	100	W
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	45	mJ
Operation and storage junction temperature	$T_{\text{stg}}, T_j$	-55 to 150	$^{\circ}\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	1.25	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction-ambient <sup>4)</sup>	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$

**Static Characteristics** ( $T_j=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	100			V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=30\text{A}$		6.3	8.0	m $\Omega$
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{V}, I_D=12\text{A}$		7.6	10	m $\Omega$
Gate threshold voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu\text{A}$	1.5		2.5	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=100\text{V}, V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate-source leakage current	$I_{GSS}$	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
Gate resistance	$R_G$	f=1 MHz, Open drain		4		$\Omega$

## Dynamic Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$V_{GS}=0V,$		2350		pF
Output capacitance	$C_{oss}$	$V_{DS}=25V,$		1281		pF
Reverse transfer capacitance	$C_{rss}$	$f=100kHz$		100		pF
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10V$		14.5		ns
Rise time	$t_r$	$V_{DS}=50V,$		7.4		ns
Turn-off delay time	$t_{d(off)}$	$R_G=2\Omega,$		40.2		ns
Fall time	$t_f$	$I_D=25A$		17		ns

## Gate Charge Characteristics

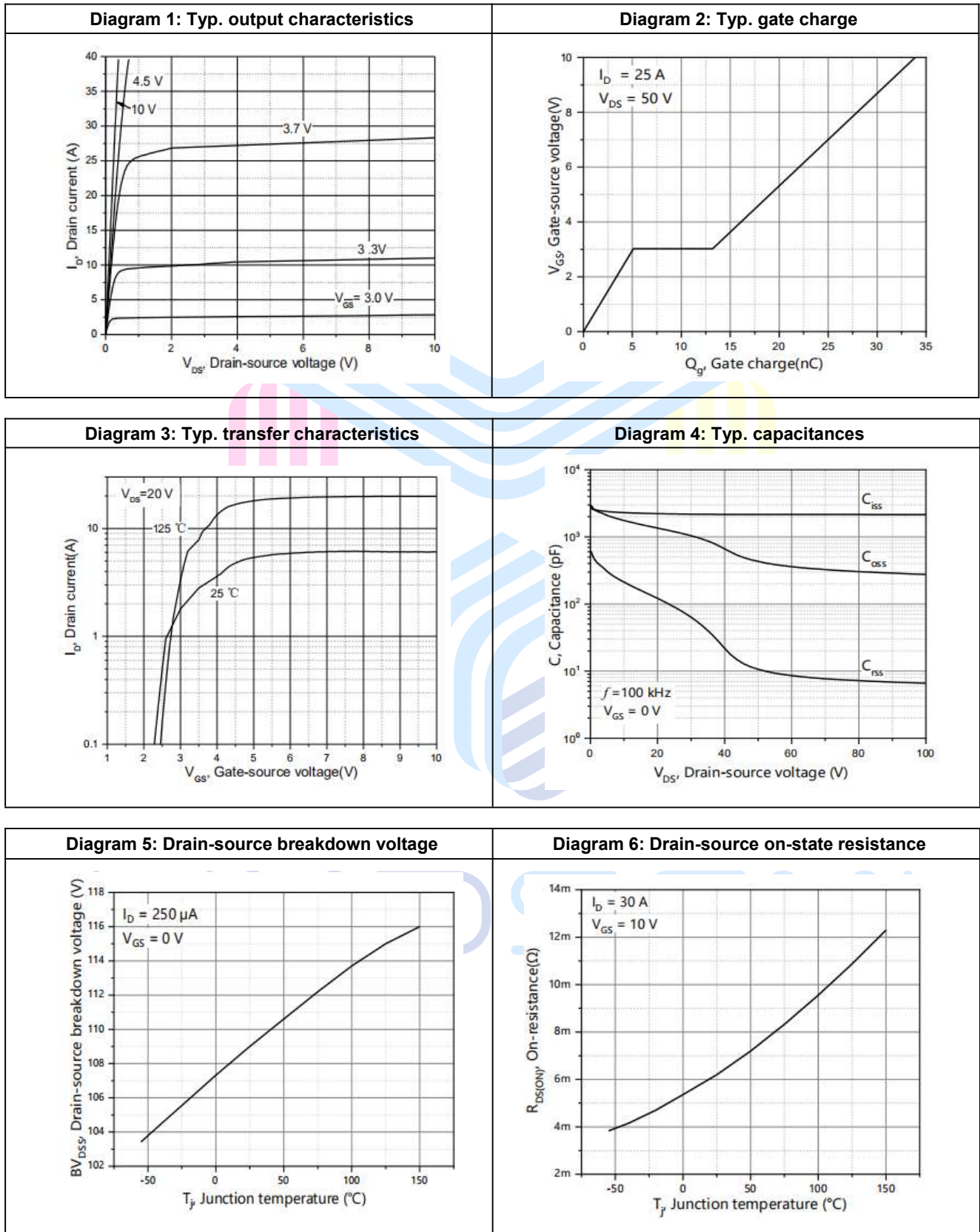
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate to source charge	$Q_{gs}$	$V_{GS}=10V,$ $V_{DS}=50V,$ $I_D=25A$		5.1		nC
Gate to drain charge	$Q_{gd}$			8.1		nC
Gate charge total	$Q_g$			33.9		nC
Gate plateau voltage	$V_{plateau}$			3.1		V

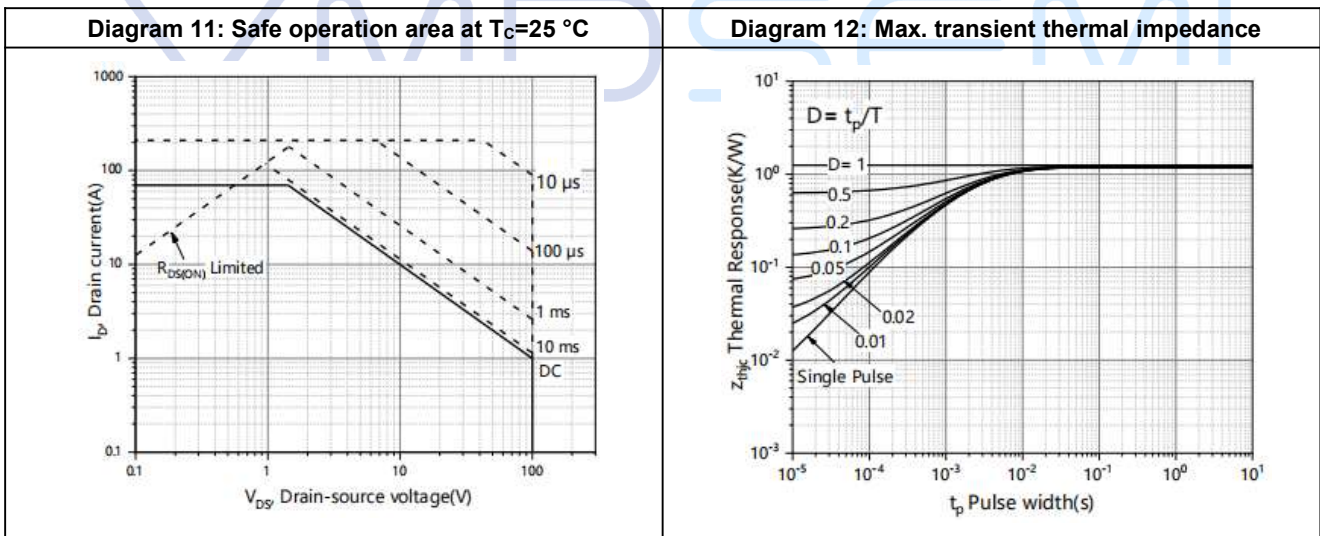
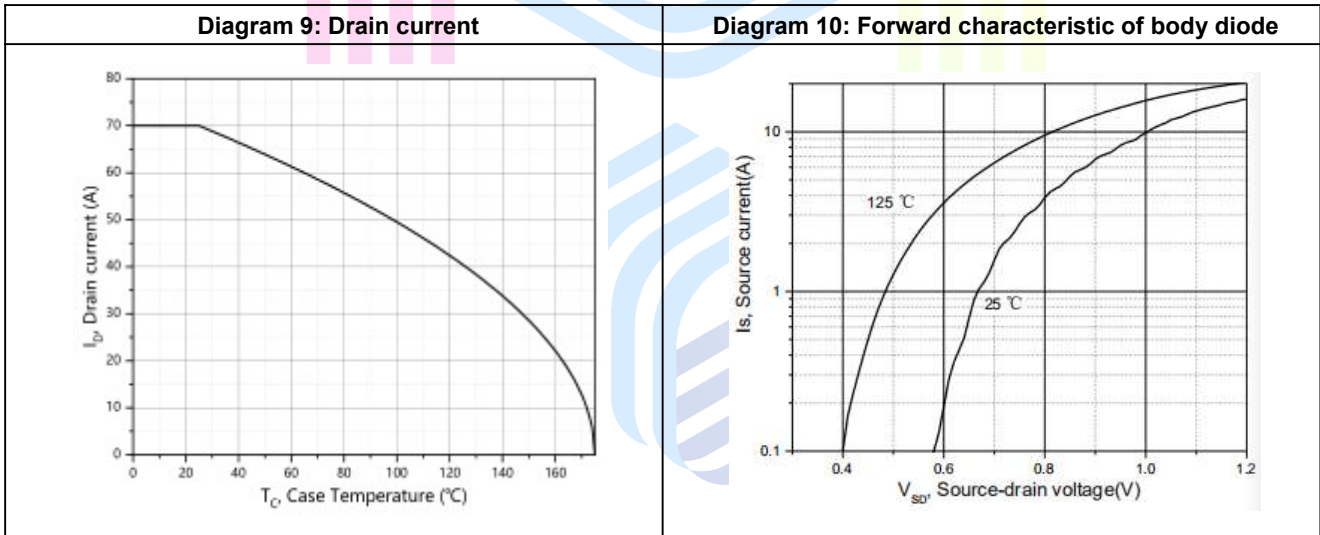
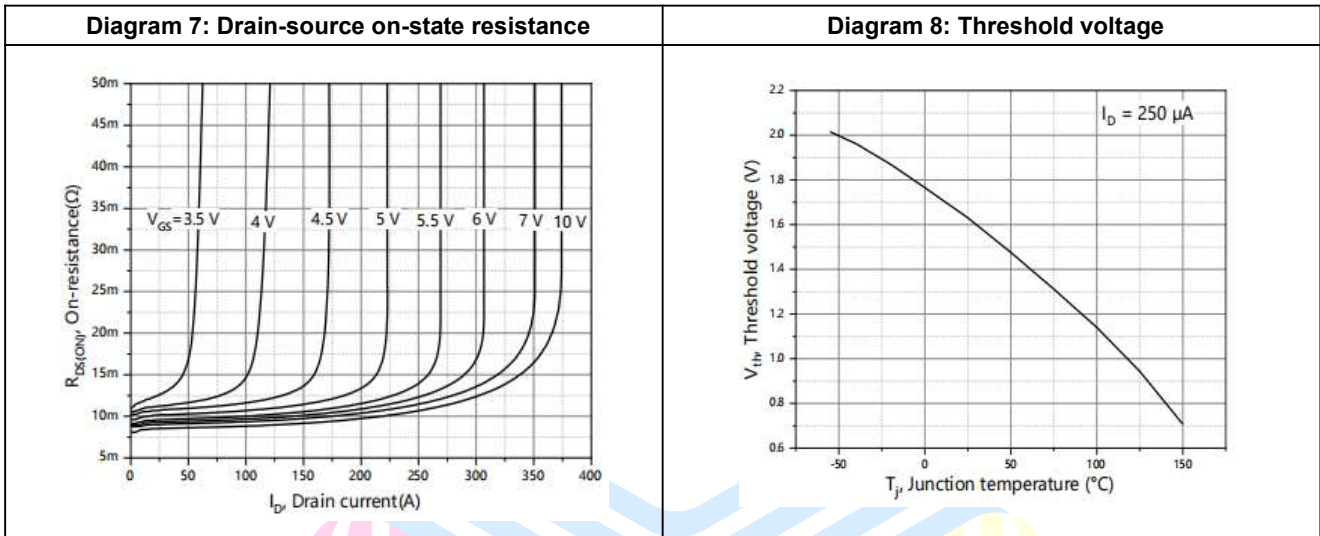
## Body Diode Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode forward voltage	$V_{SD}$	$V_{GS}=0V, I_S=20A$			1.3	V
Reverse recovery time	$t_{rr}$	$V_R=50V,$ $I_S=25A,$ $di/dt=100A/\mu s$		51.1		ns
Reverse recovery charge	$Q_{rr}$			102.3		nC
Peak reverse recovery current	$I_{rrm}$			2.9		A

### Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3)  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25\text{ }^\circ\text{C}$ .
- 5)  $V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, L=0.3\text{ mH}$ , starting  $T_j=25\text{ }^\circ\text{C}$ .

**Electrical characteristics diagram**




Test Circuits and waveforms

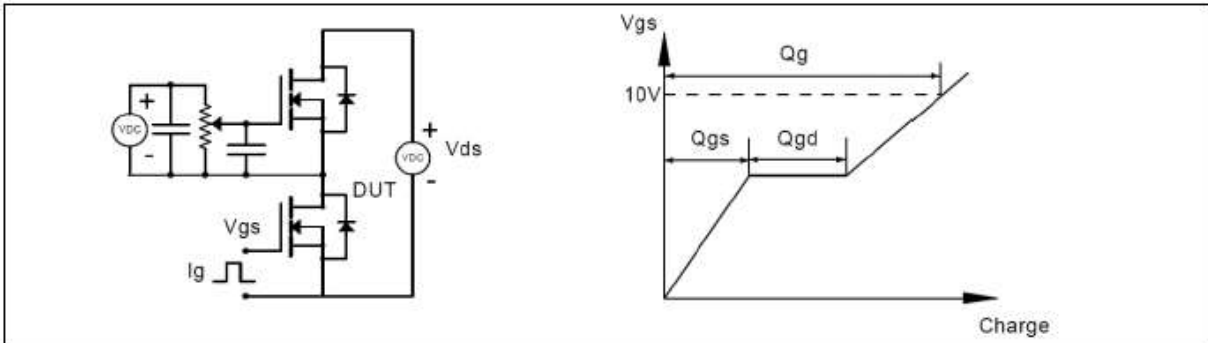


Figure 1. Gate charge test circuit & waveform

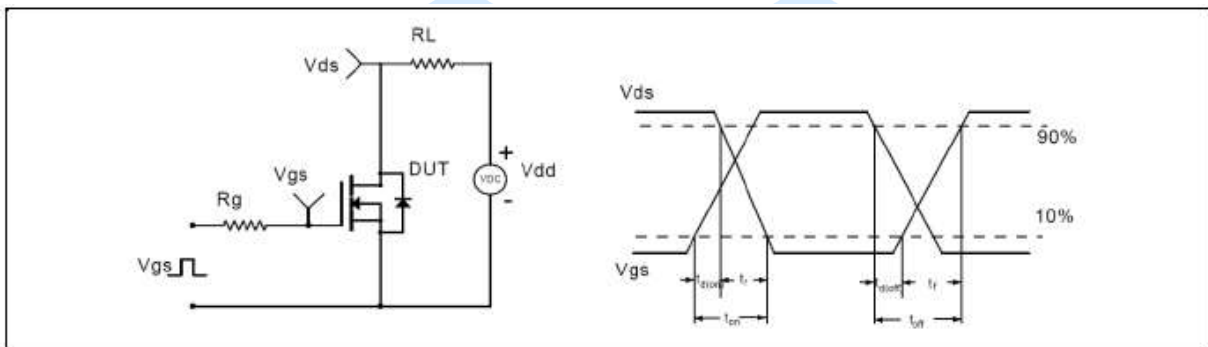


Figure 2. Switching time test circuit & waveforms

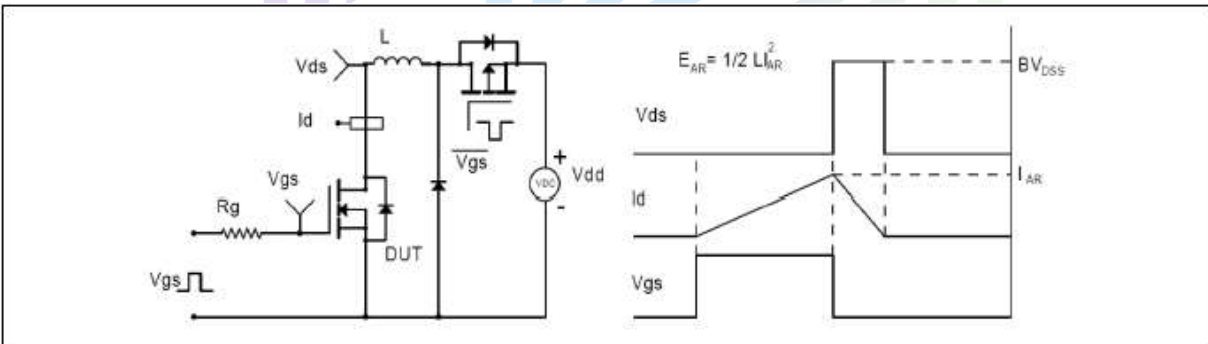


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

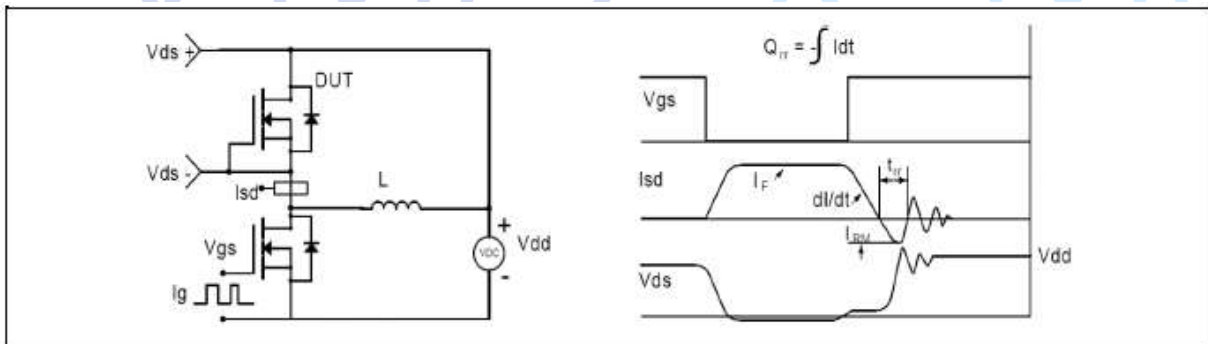
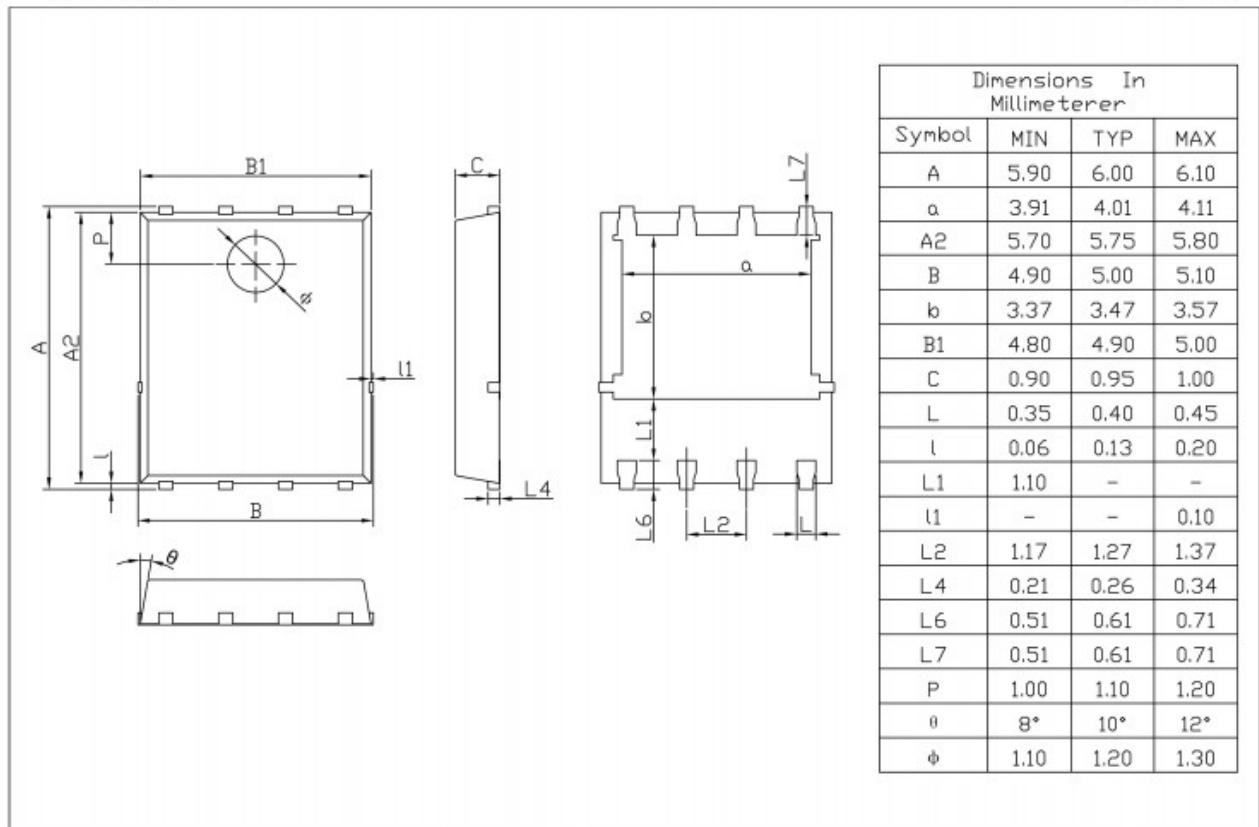


Figure 4. Diode reverse recovery test circuit & waveforms

**Package Outlines**

PDFN5 X6

Unit:mm



Outline PDFN5\*6

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## Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2021-05-08	Release version



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