

30V N-Channel Enhancement Mode MOSFET

General Features

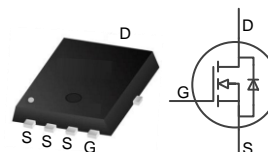
- Low $R_{DS(ON)}$
- Low Gate Charge
- Advanced high Cell density Trench Technology
- RoHS Compliant
- Halogen-free available
- 100% Avalanche Tested

BV_{DSS}	$R_{DS(ON)}$ @ $V_{GS}=10V$	$R_{DS(ON)}$ @ $V_{GS}=4.5V$
30V	7.3mΩ	9.0 mΩ
I_D	45A	

Applications

- Power Management in Inverter System
- Synchronous Rectification
- Load Switch

PDFN3333



Ordering Information

Part Number	Package	Marking	Remark
AKF30N10S	PDFN3333	30N10S	Halogen Free

Absolute Maximum Ratings

 $T_A=25\text{ }^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Rating	Unit	
V_{DSS}	Drain-Source Voltage ^[1]	30	V	
V_{GS}	Gate –Source Voltage	± 20	V	
I_D	Continuous Drain Current	$T_C=25\text{ }^\circ\text{C}$	45	A
		$T_C=100\text{ }^\circ\text{C}$	28	A
I_{DP}	300us Pulsed Drain Current Tested ^[2]	180	A	
EAS	Single Pulse Avalanche Energy ^[3]	25	mJ	
P_D	Power Dissipation	30	W	
	Derating Factor above 25 $^\circ\text{C}$	0.24	W/ $^\circ\text{C}$	
T_J and T_{STG}	Operating and Storage Temperature Range	-55 ~ 150	$^\circ\text{C}$	

*Drain Current limited by Maximum Junction Temperature.

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	34	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.2	$^\circ\text{C}/\text{W}$

Electrical Characteristics

OFF Characteristics (TA=25 °C unless otherwise noted)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV _{DSS}	Drain-Source Breakdown Voltage	30	--	--	V	V _{GS} =0V, I _D =250μA
I _{DSS}	Zero Gate Voltage Drain Current	--	--	1	μA	V _{DS} =24V, V _{GS} =0V
I _{GSS}	Gate Leakage Current	--	--	100	nA	V _{GS} =20V, V _{DS} =0V
		--	--	-100	nA	V _{GS} =-20V, V _{DS} =0V

On Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R _{DS(ON)}	Drain-Source On-Resistance ^[4]	--	7.3	9.3	mΩ	V _{GS} =10V, I _D =15A
		--	9.0	12	mΩ	V _{GS} =4.5V, I _D =10A
V _{GS(TH)}	Gate Threshold Voltage	1.0	1.4	2.0	V	V _{DS} = V _{GS} , I _D =250μA
GFS	Forward Transconductance	--	47	--	S	V _{DS} =5V, I _D =15A

Dynamic Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C _{iss}	Input Capacitance	--	1374	--	pF	V _{GS} =0V, V _{DS} =15V, f=1MHz
C _{oss}	Output Capacitance	--	165	--		
C _{rss}	Reverse Transfer Capacitance	--	102	--		
Q _g	Total Gate Charge	--	9.6	--	nC	V _{DS} =15V, V _{GS} =4.5V, I _D =10A
Q _{gs}	Gate-Source Charge	--	3.1	--		
Q _{gd}	Gate-Drain Charge	--	3.3	--		
R _g	Gate Resistance	--	8	--	Ω	f=1MHz

Resistive Switch Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
t _{d(on)}	Turn-On Delay Time	--	23	--	ns	V _{DD} =15V I _D =15A, V _{GS} =10V R _G =3.3Ω
t _r	Turn-On Rise Time	--	24	--		
t _{d(off)}	Turn-Off Delay Time	--	185	--		
t _f	Turn-Off Fall Time	--	71	--		

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current(Body Diode)	--	--	45	A	Integral P-N diode in MOSFET
I_{SM}	Maximum Pulsed Current(Body Diode)	--	--	180	A	
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_{SD}=1A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	--	47	--	ns	$I_{SD}=15A,$ $dI_{SD}/dt=100A/\mu S$
Q_{rr}	Reverse Recovery Charge	--	35	--	nC	

NOTE:

[1] $T_j=+25\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$

[2] Repetitive rating, pulse width limited by maximum junction temperature.

[3] $L=0.5\text{mH}$, $I_{AS}=10\text{A}$, Starting $T_j=25\text{ }^{\circ}\text{C}$.

[4] Pulse width $\leq 380\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

Typical Characteristics

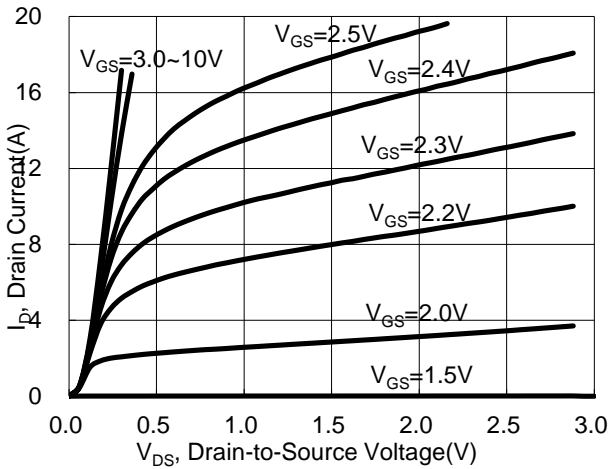
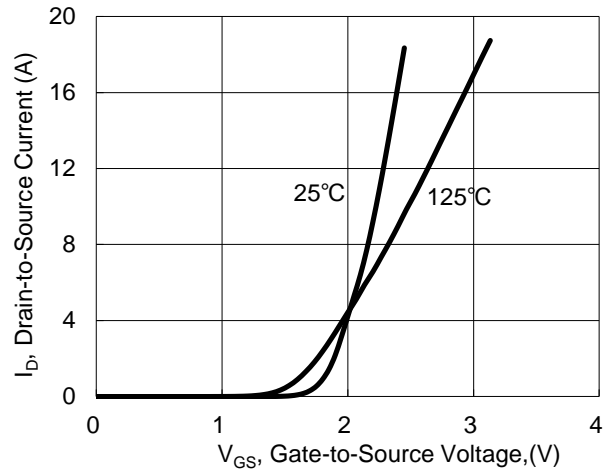
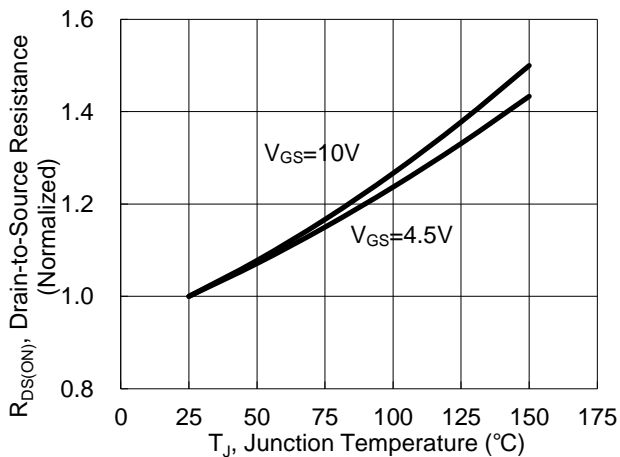
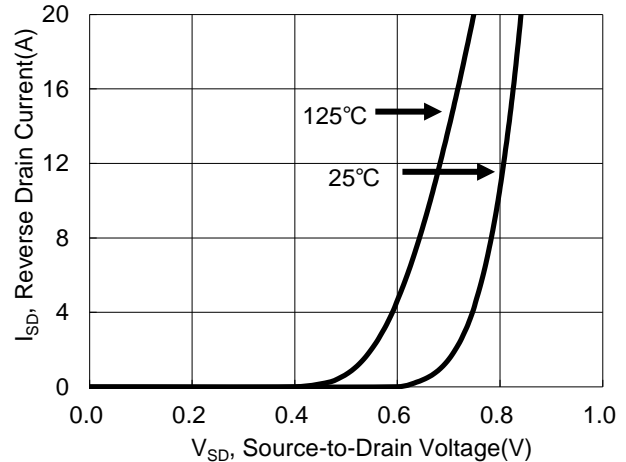
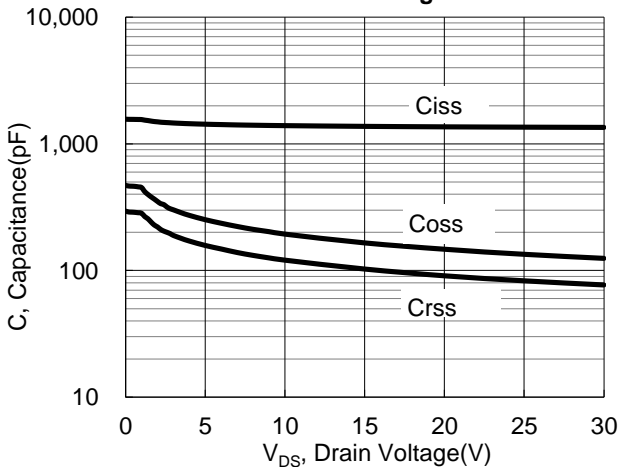
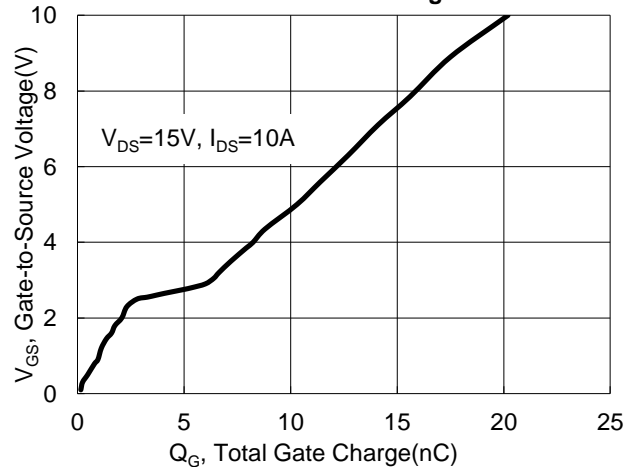
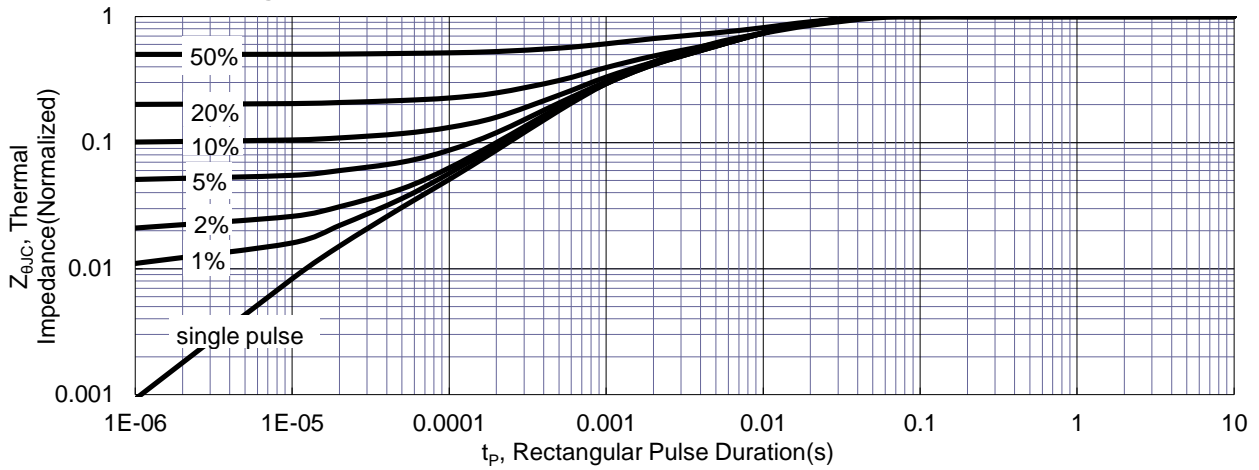
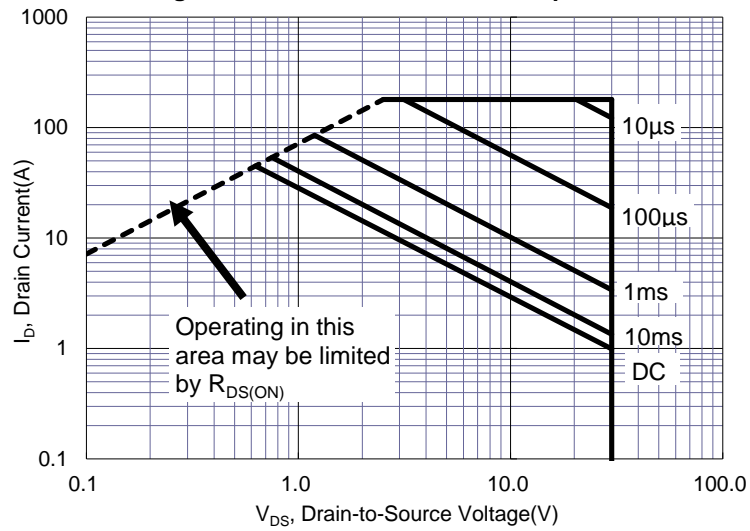
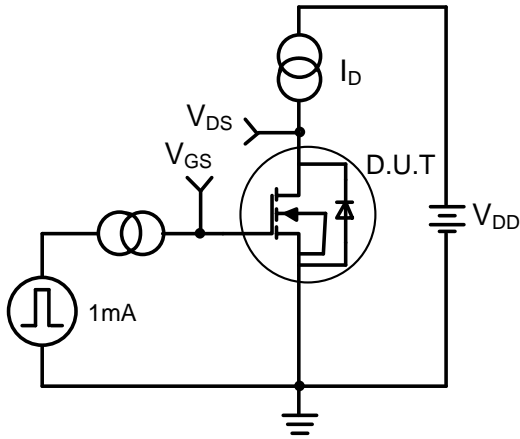
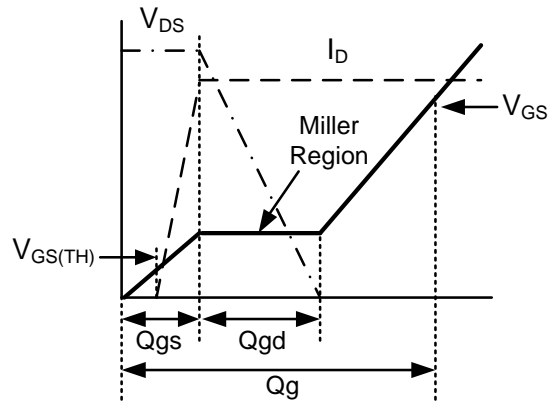
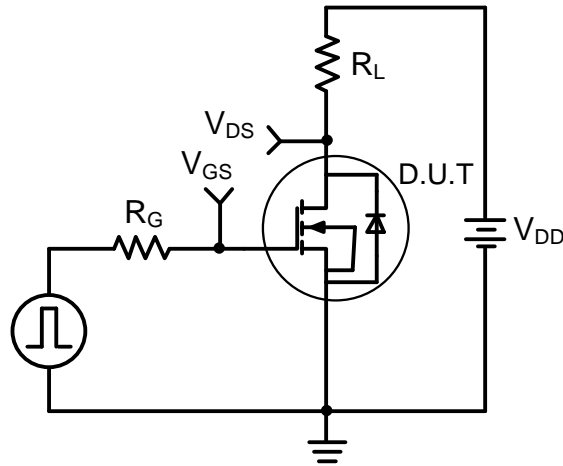
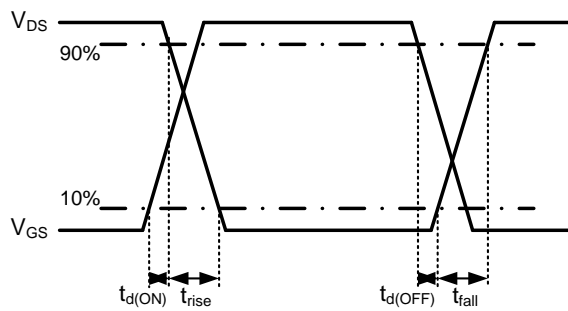
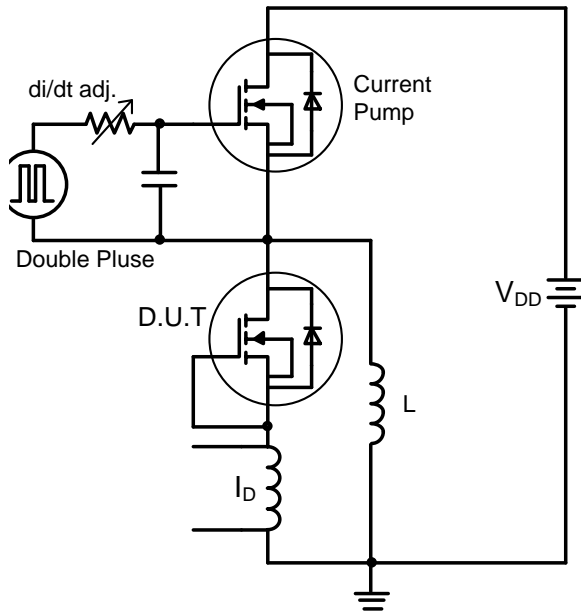
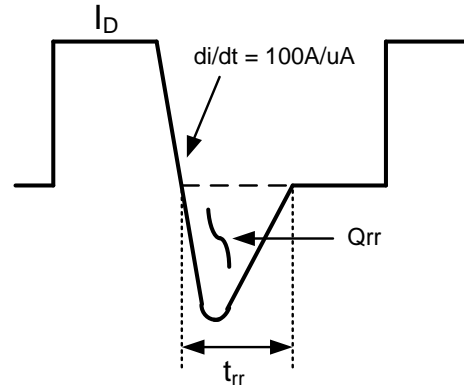
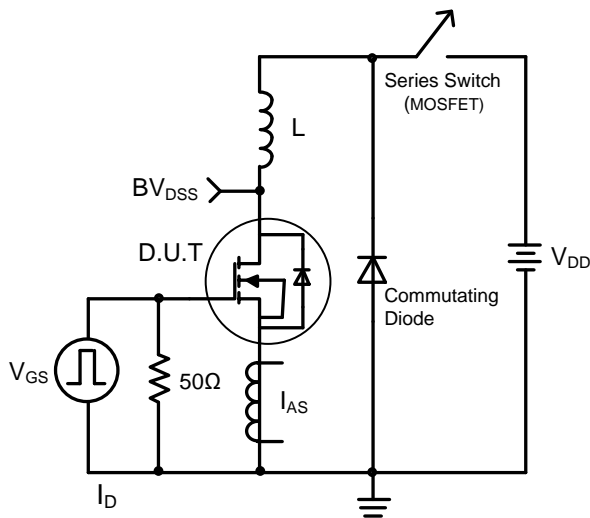
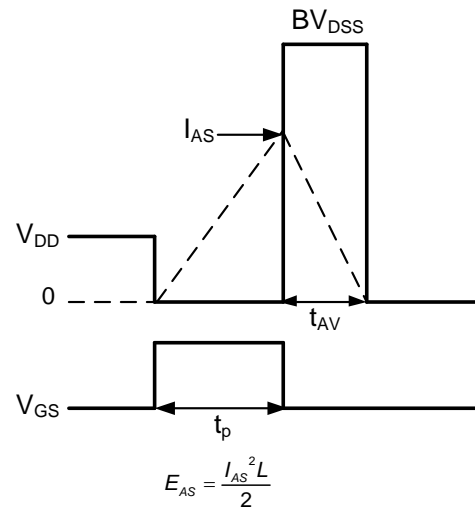
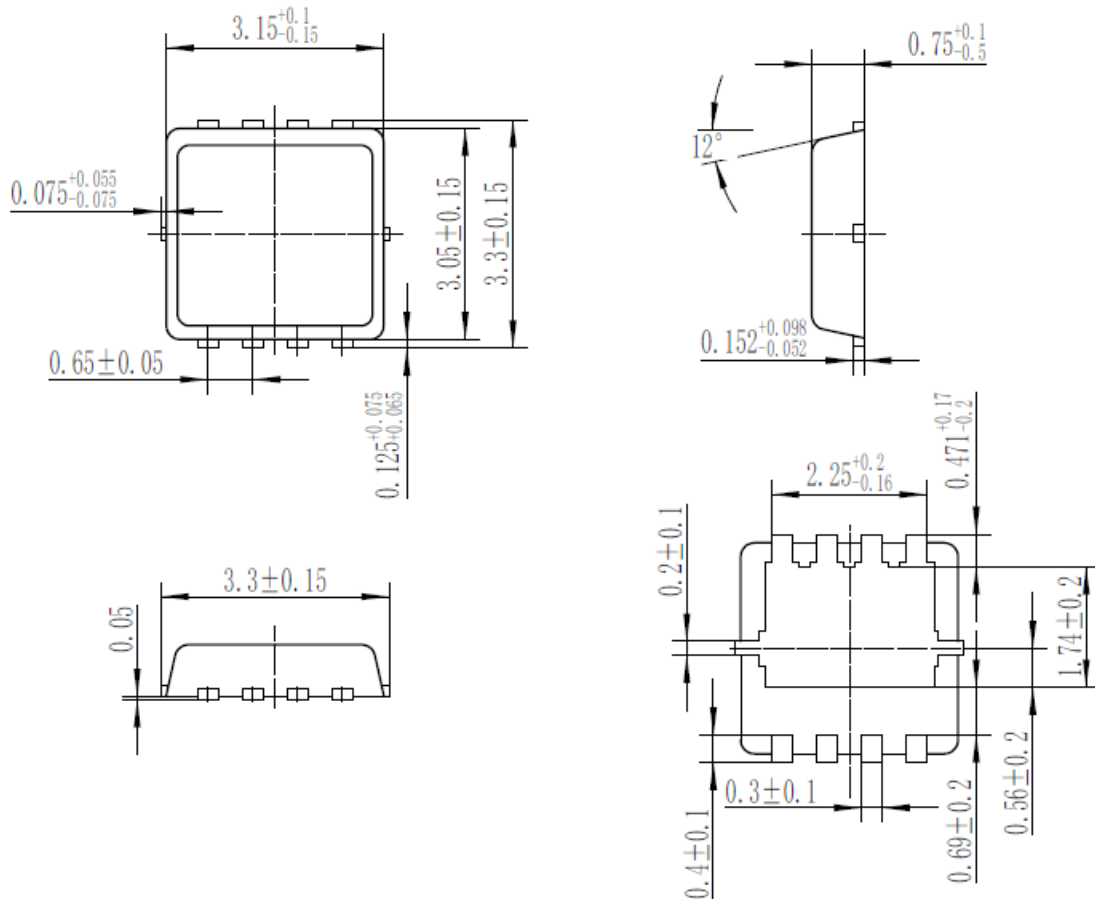
Figure 1. Typical Output Characteristics

Figure 2. Typical Transfer Characteristics

Figure 3. Typical Drain-to-Source On Resistance vs. Junction Temperature

Figure 4. Typical Body Diode Transfer Characteristics

Figure 5. Typical Capacitance vs. Drain-to-Source Voltage

Figure 6. Typical Gate Charge vs. Gate-to-Source Voltage


Figure 7. Maximum Effective Thermal Impedance, Junction-to-Case

Figure 8. Maximum Forward Safe Operation Area


Test Circuit

Figure 9. Gate Charge Test Circuit

Figure 10. Gate Charge Waveform

Figure 11. Resistive Switching Test Circuit

Figure 12. Resistive Switching Waveforms


Figure 13. Diode Reverse Recovery Test Circuit

Figure 14. Diode Reverse Recovery Waveform

Figure 15. Unclamped Inductive Switching Test Circuit

Figure 16. Unclamped Inductive Switching Waveforms

Package Dimensions
PDFN3333




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