

P-Channel 30V(D-S) MOSFET

Product summary		
V_{DS}	-30	V
$R_{DS(ON)}$ (at $V_{GS}=-10V$) Typ.	11	m Ω
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$) Typ.	18.5	m Ω
I_D ($T_C=25^\circ C$)	-20	A

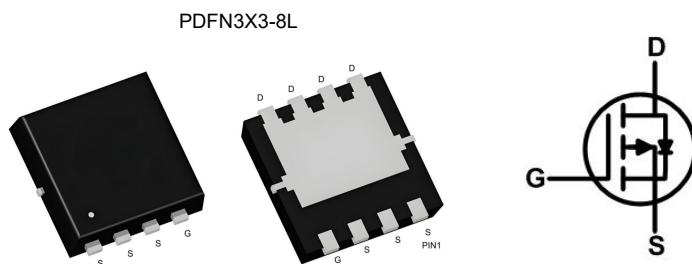
Features

- Advanced Trench technology
- Low Gate Charge

Applications

- Load switching
- PWM Applications
- Power Management

Pin Configuration



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAL20P03A	PDFN3X3-8L	13"	5000pcs

Absolute Maximum Ratings (at $T_A=25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_C=25^\circ C$	-20
		$T_C=100^\circ C$	-13
I_{DM}	Pulse Drain Current Tested ^A	-60	A
E_{AS}	Single Pulse Avalanche Energy ^B	40	mJ
P_D	Power Dissipation	$T_C=25^\circ C$	15
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JC}$	Thermal Resistance-Junction to case max	8.3	$^\circ C/W$

Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-30V, V_{GS}=0V$	--	--	-1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ^C	$V_{GS}=-10V, I_D=-10A$	--	11	14	m Ω
		$V_{GS}=-4.5V, I_D=-5A$	--	18.5	24.5	m Ω
Dynamic Parameters ^D						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-15V$ $f=1\text{MHz}$	--	980	--	pF
C_{oss}	Output Capacitance		--	170	--	pF
C_{rss}	Reverse Transfer Capacitance		--	146	--	pF
Q_g	Total Gate Charge	$V_{DS}=-15V, I_D=-5A$ $V_{GS}=-10V$	--	22	--	nC
Q_{gs}	Gate-Source Charge		--	4	--	nC
Q_{gd}	Gate-Drain Charge		--	5.8	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DD}=-15V$ $I_D=-5A, V_{GS}=-10V,$ $R_{GEN}=2.5\Omega$	--	10	--	ns
t_r	Turn-on Rise Time		--	14	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	49	--	ns
t_f	Turn-off Fall Time		--	20	--	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	-20	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	-60	A
V_{SD}	Diode Forward Voltage	$I_S=-10A, V_{GS}=0V$	--	--	-1.2	V
t_{rr}	Reverse recovery time	$I_F=-5A,$ $di/dt=100\text{ A/us}$	--	64	--	ns
Q_{rr}	Reverse recovery charge		--	25	--	nC

Note:

- A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
- B. The EAS data shows Max. rating . The test condition is $V_{DD}=-15V, V_G=-10V, L=0.5\text{mH}, I_{AS}=-12.7A, R_g=25\Omega, T_J=25^\circ\text{C}$.
- C. Pulse Test: Pulse Width $\leq 300\mu s$, Duty cycle $\leq 0.5\%$.
- D. Guaranteed by design, not subject to production testing.

Typical Characteristics

Figure 1: Output Characteristics

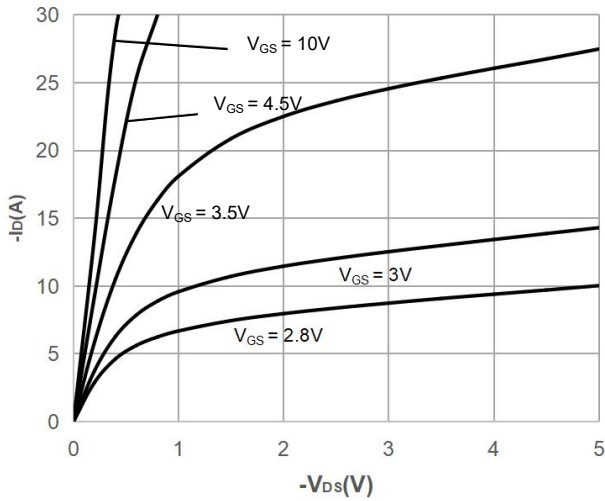


Figure 2: Typical Transfer Characteristics

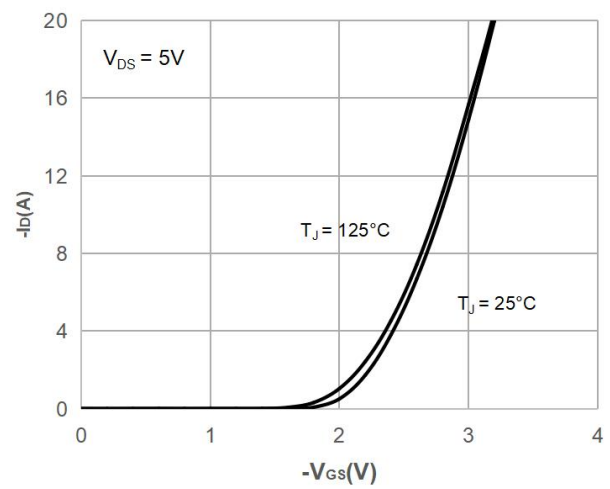


Figure 3: On-resistance vs. Drain Current

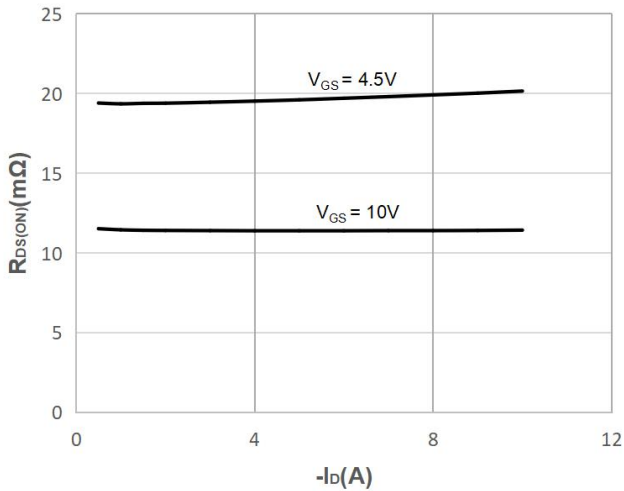


Figure 4: Body Diode Characteristics

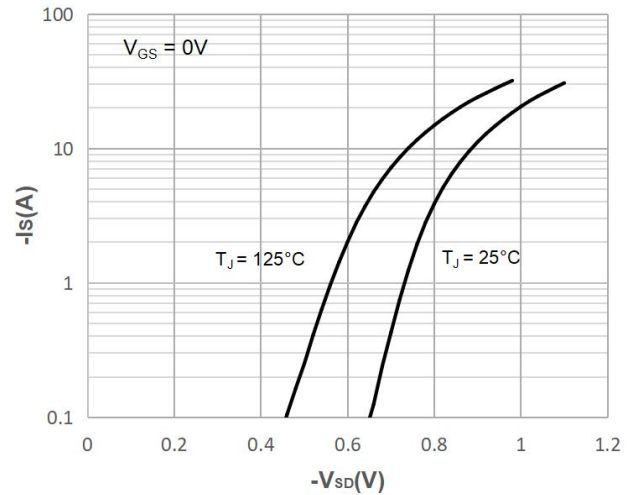


Figure 5: Gate Charge Characteristics

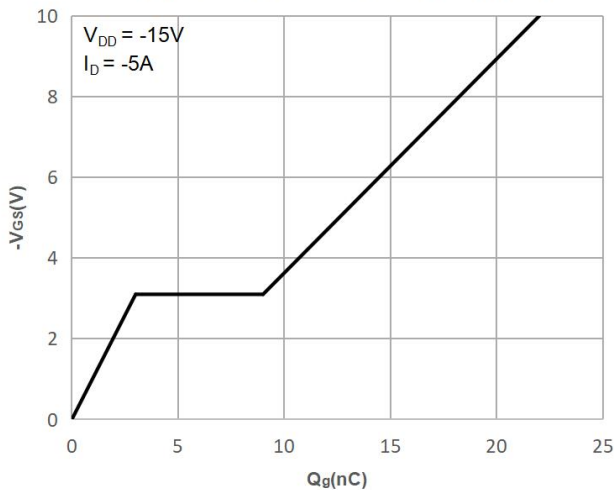
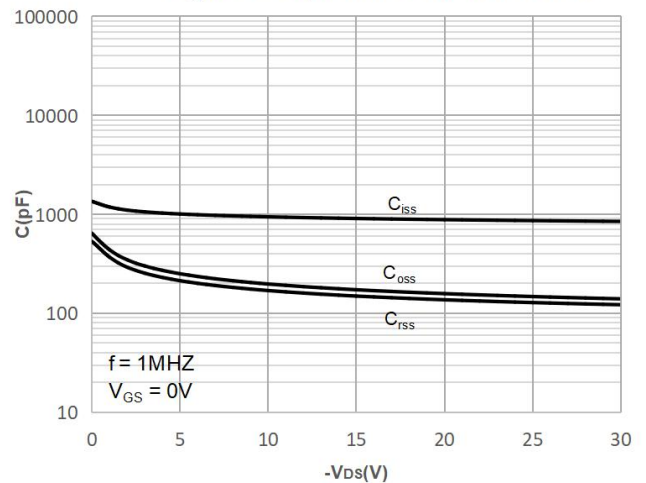


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

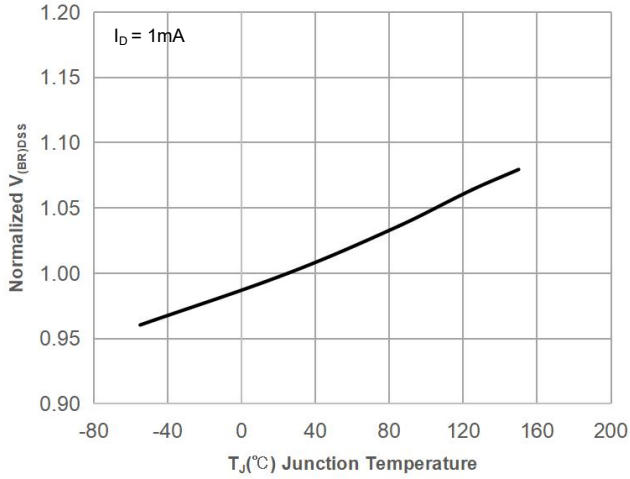


Figure 8: Normalized on Resistance vs. Junction Temperature

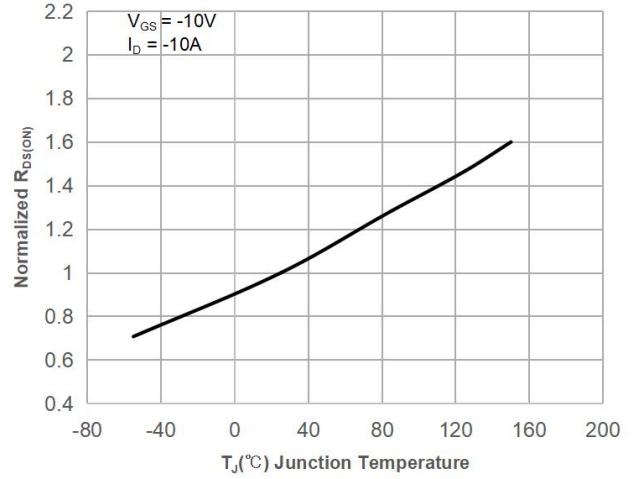


Figure 9: Maximum Safe Operating Area

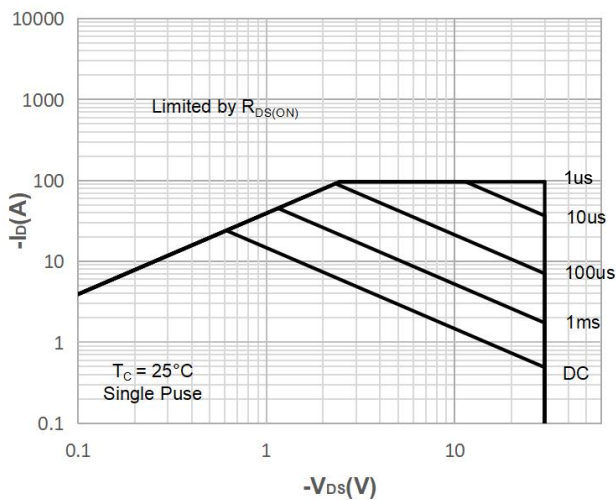


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

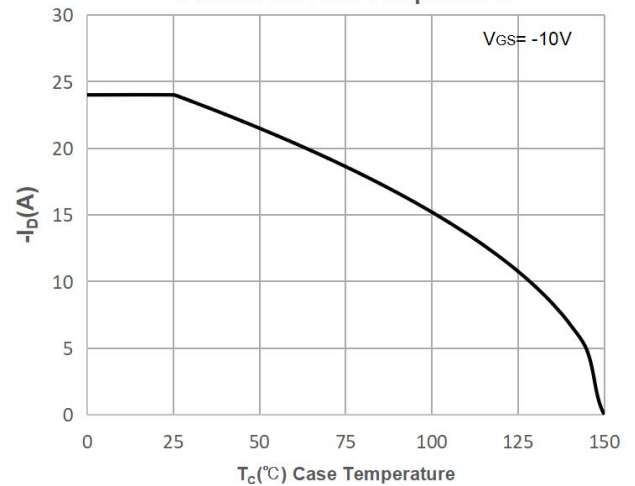


Figure 11: Normalized Maximum Transient Thermal Impedance

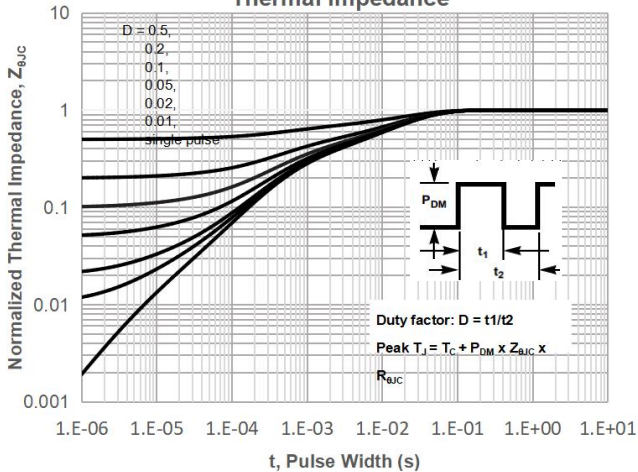
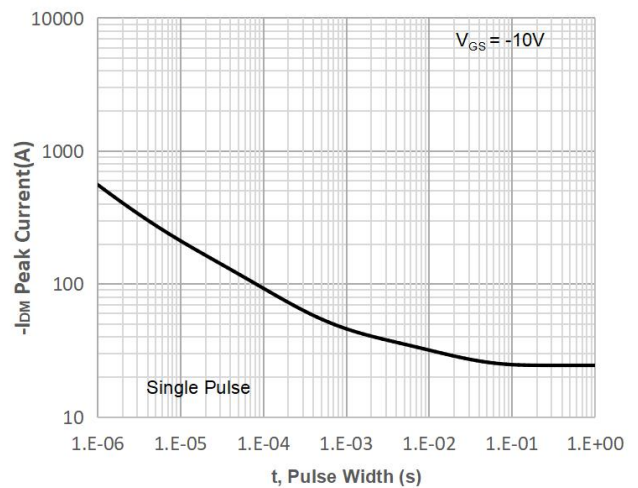


Figure 12: Peak Current Capacity



Test Circuit

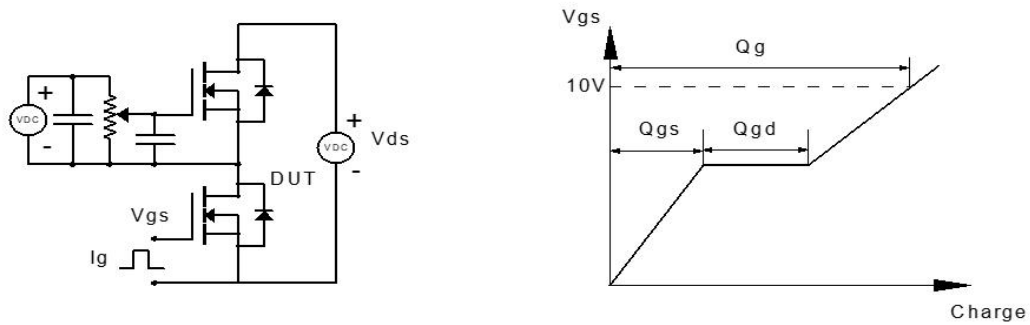


Figure 1: Gate Charge Test Circuit & Waveform

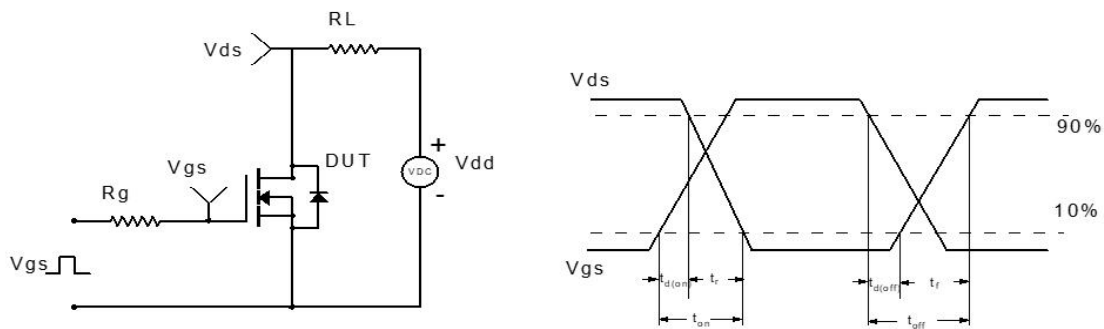


Figure 2: Resistive Switching Test Circuit & Waveform

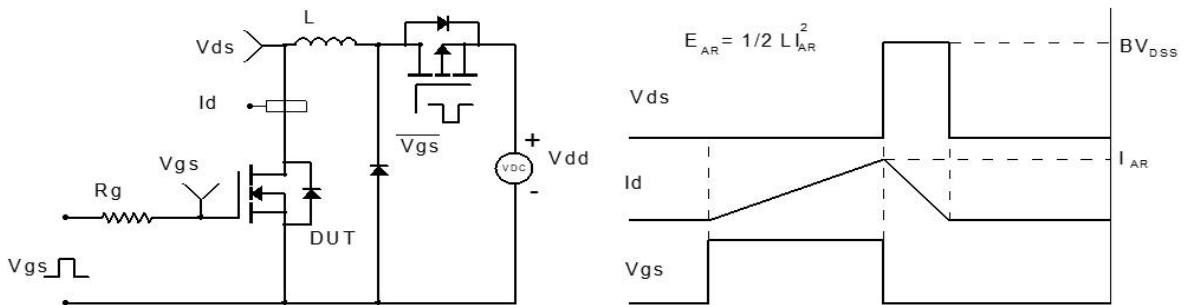


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

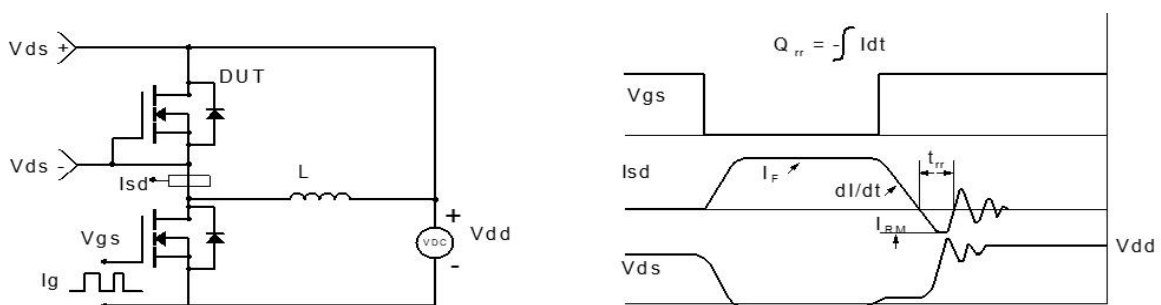
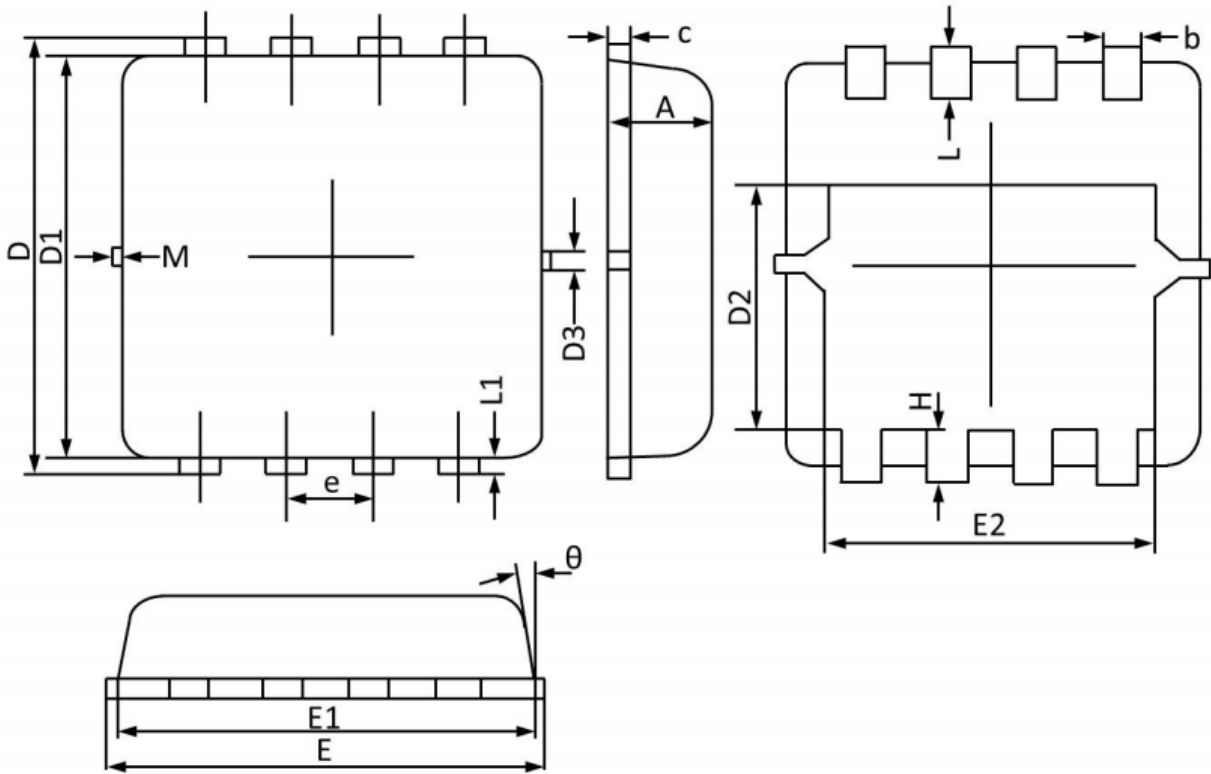


Figure 4: Diode Recovery Test Circuit & Waveform

PDFN3X3-8L Package Information (unit:mm)



DIMENSIONS

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	b	0.25	0.30	0.35
C	0.10	0.15	0.25	D	3.25	3.35	3.45
D1	3.00	3.10	3.20	D2	1.78	1.88	1.98
D3	--	0.13	--	E	3.20	3.30	3.40
E1	3.00	3.15	3.20	E2	2.39	2.49	2.59
e	0.65BSC			H	0.30	0.39	0.50
L	0.30	0.40	0.50	L1	--	0.13	--
θ	--	10°	12°	M	*	*	0.15