

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

Product Summary



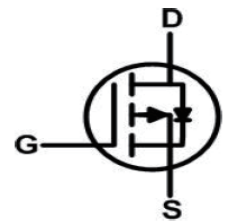
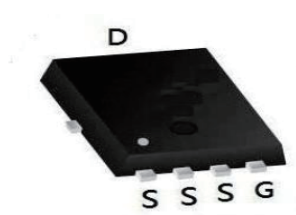
BVDSS	RDS(on)	ID
-30V	8.7mΩ	-50A

Description

The 50P03D is the high cell density trenched P-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The 50P03D meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

PDFN3*3 Pin Configuration



Absolute Maximum Ratings (TA=25°C unless otherwise specified)

Symbol	Parameter	Rating		Units
		10s	Steady State	
V _{DS}	Drain-Source Voltage		-30	V
V _{GS}	Gate-Source Voltage		±25	V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ 10V ¹		-50	A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V ¹		-32	A
I _{DM}	Pulsed Drain Current ²		-150	A
EAS	Single Pulse Avalanche Energy ³		125	mJ
I _{AS}	Avalanche Current		-50	A
P _D @T _A =25°C	Total Power Dissipation ⁴	5	2	W
T _{STG}	Storage Temperature Range		-55 to 175	°C
T _J	Operating Junction Temperature Range		-55 to 175	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ¹	---	62	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	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 to Body Leakage Current	$V_{DS}=0V, V_{GS}= \pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D = -250\mu A$	-1	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>Note3</small>	$V_{GS} = -10V, I_D = -10A$	-	9.5	14	m Ω
		$V_{GS} = -4.5V, I_D = -5A$	-	17	24	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -15V, V_{GS}=0V,$ $f=1.0MHz$	-	1770	-	pF
C_{oss}	Output Capacitance		-	233	-	pF
C_{riss}	Reverse Transfer Capacitance		-	206	-	pF
Q_g	Total Gate Charge	$V_{DS} = -15V, I_D = -5A,$ $V_{GS} = -10V$	-	22	-	nC
Q_{gs}	Gate-Source Charge		-	1	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	1.8	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = -15V, I_D = -10A,$ $V_{GS} = -10V, R_{GEN} = 2.5\Omega$	-	9	-	ns
t_r	Turn-on Rise Time		-	13	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	48	-	ns
t_f	Turn-off Fall Time		-	20	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-15	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-60	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S = -15A$	-	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$T_J = 25^\circ\text{C},$	-	64	-	ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = -24V, I_F = -2.8A,$ $dI/dt = -100A/\mu s$	-	25	-	nC

Note :

- 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}, V_{GS} = 10V, R_G = 25\Omega, L = 0.5mH, I_{AS} = -12.7A$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

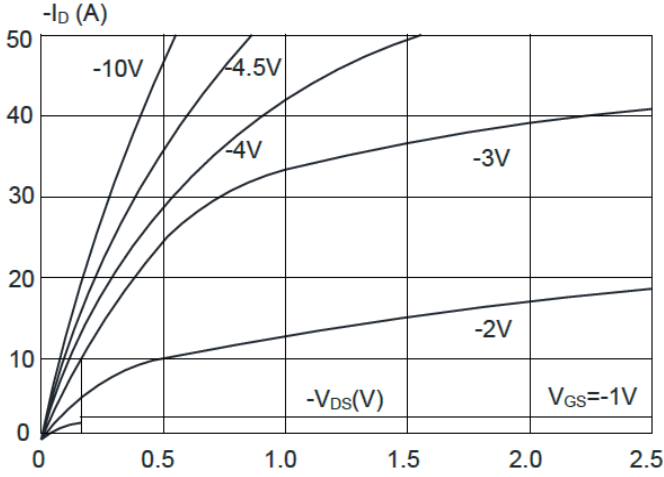


Figure 2: Typical Transfer Characteristics

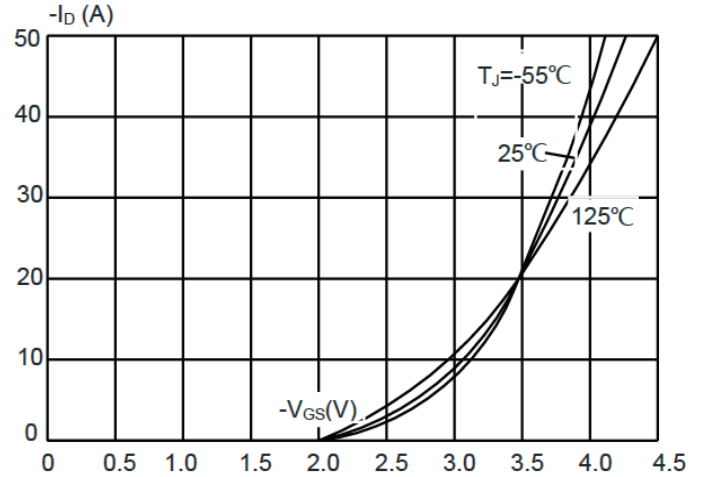


Figure 3: On-resistance vs. Drain Current

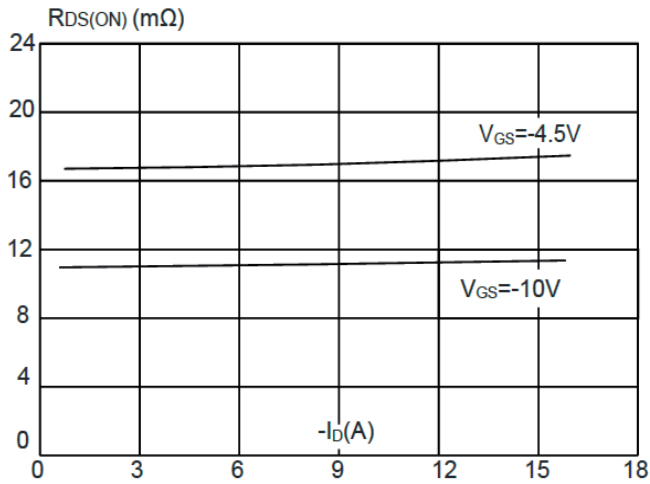


Figure 4: Body Diode Characteristics

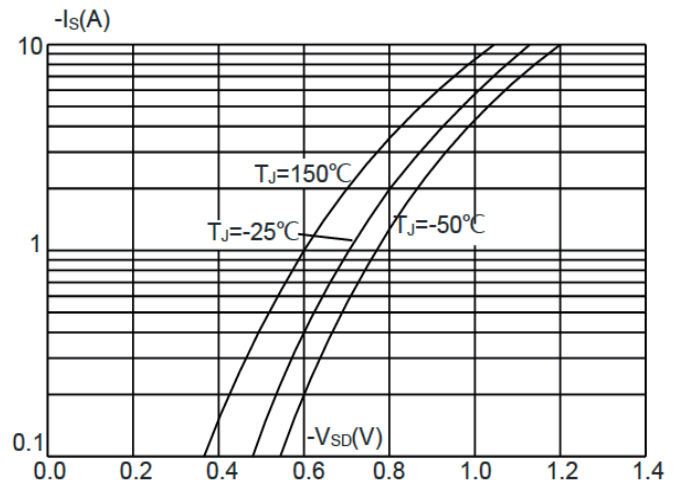


Figure 5: Gate Charge Characteristics

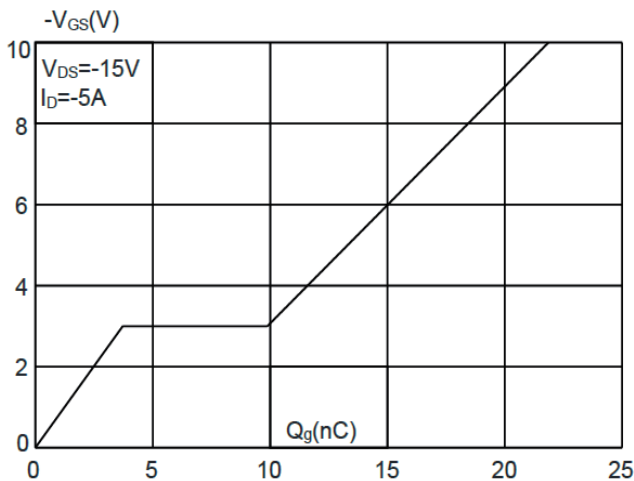
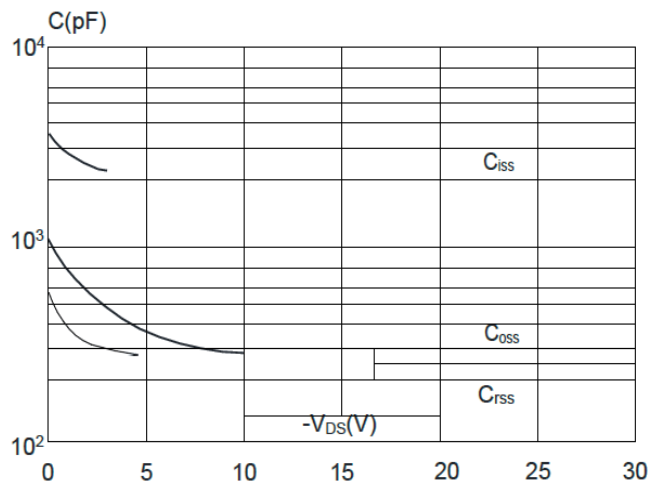


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

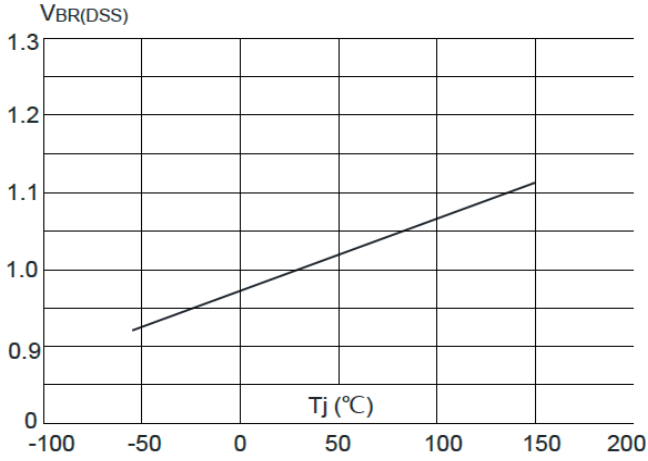


Figure 8: Normalized on Resistance vs. Junction Temperature

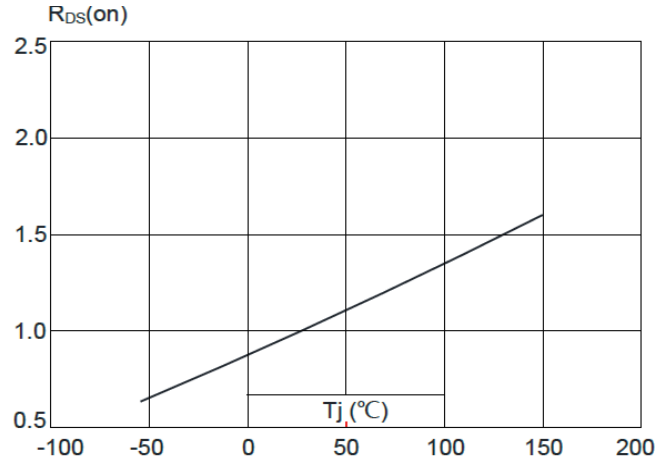


Figure 9: Maximum Safe Operating Area

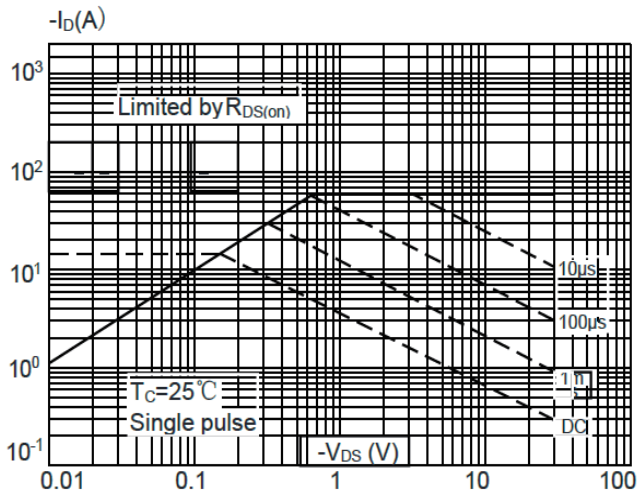


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

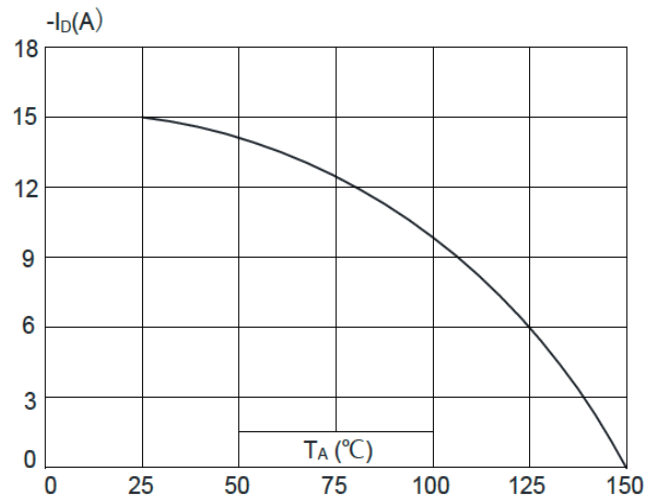
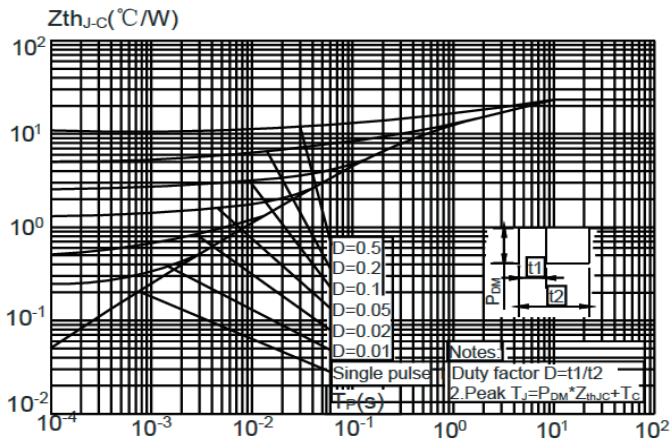
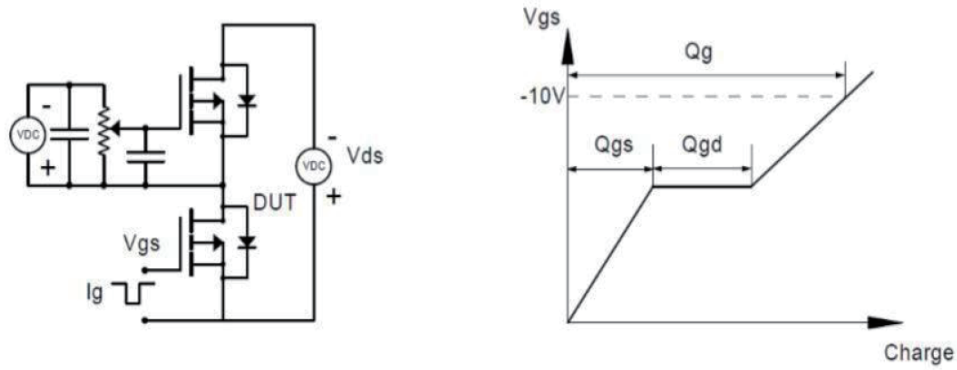


Figure 11: Maximum Effective Transient Thermal Impedance Junction to Ambient

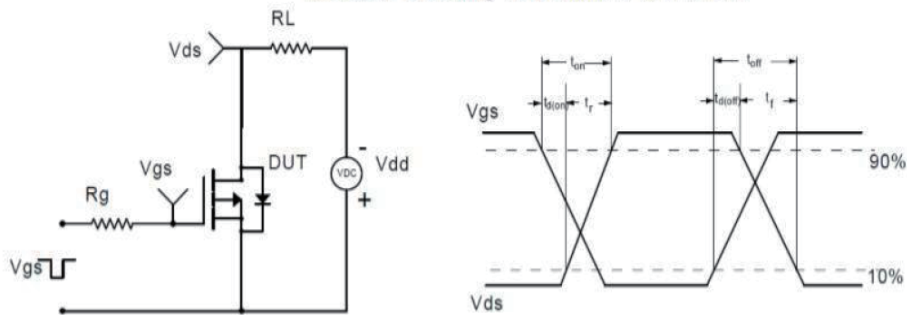


Test Circuit

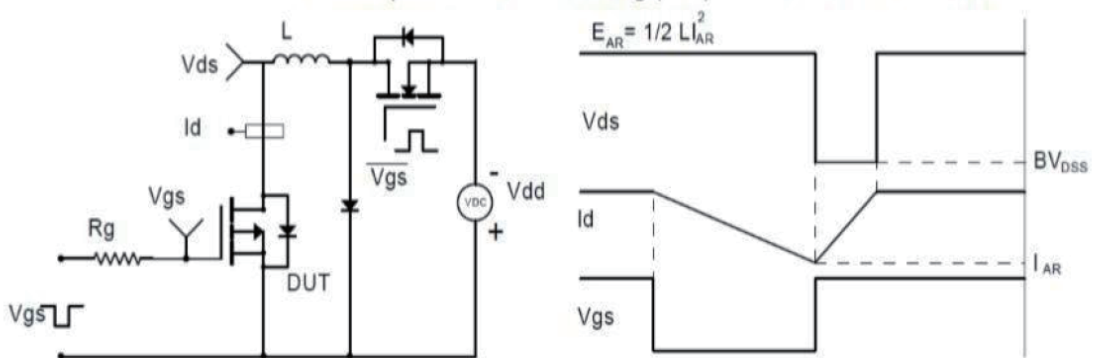
Gate Charge Test Circuit & Waveform



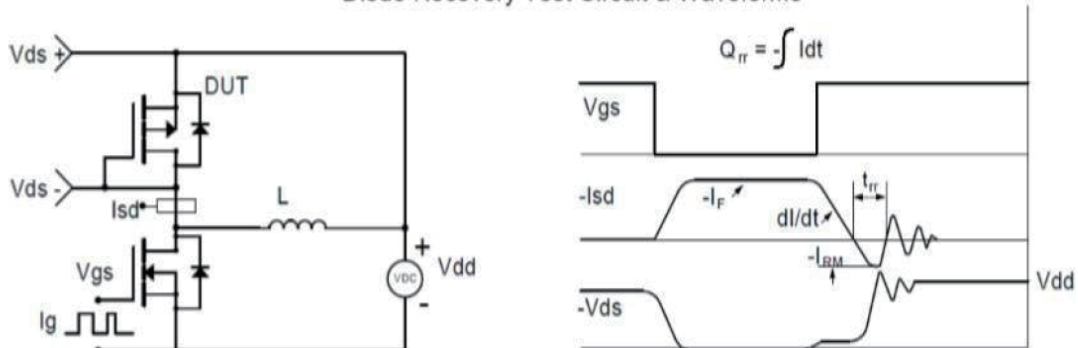
Resistive Switching Test Circuit & Waveforms



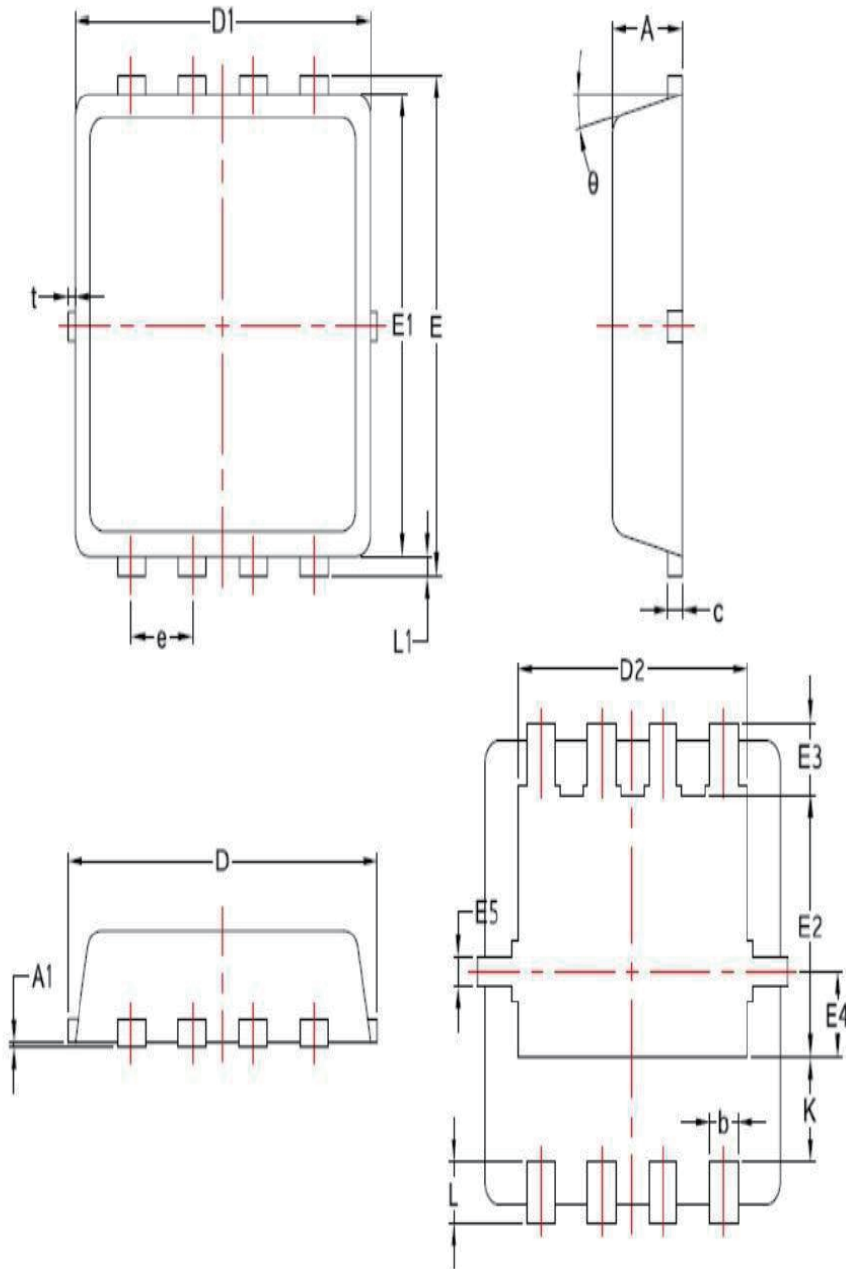
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data- PDFN3.3X3.3-8L



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°