30V N-Channel MOS

Description

The NP45N03 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. Standard Product NP45N03 is Pb-free (meets ROHS & Sony 259 specifications).

General Features

- V_{DS} =30V I_D =45A
  $R_{DS(ON)}$(Typ.)=6.3mΩ @V_{GS}=10V
  High power and current handing capability
- Lead free product is acquired
- Surface mount package

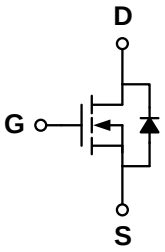
Application

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load switch

Package

- DFN3×3-8L

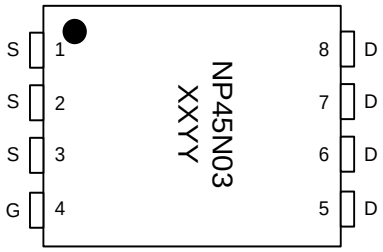
Schematic diagram



Marking and pin assignment

DFN3×3-8L

（Top View）



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP45N03QR-G	-55°C to +150°C	DFN3×3-8L	3000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25°C	I_D	45	A
	TC=100°C		28	
Pulsed Drain Current		I_{DP}	180	A
Avalanche Current		IAS	32	A
Avalanche energy(L=0.5mH)		EAS	120	mJ
Maximum power dissipation	TC=25°C	P_D	28	W
Power Dissipation – Derate above 25℃	TC=25°C		1.67	
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	30	-	-	V
BVDSS Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25℃,ID=1mA		27		mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.6	2.5	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=10V, I_D=45A	-	6.3	7	mΩ
		V_{GS}=4.5V, I_D=40A		9.9	12.9	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=10V, V_{GS}=10V	50	-	-	A
Diode Characteristics						
Diode Forward Voltage[1]	V_{SD}	I_{SD}=1A,V_{GS}=0V	-	0.8	1.1	V
Diode Continuous Forward Current	I_S		-	-	46	A
Reverse Recovery Time	t_{rr}	I_F=30A, dI/dt=100A/us	-	9.2	-	ns
Reverse Recovery Charge	Q_{rr}		-	2	-	nC
Dynamic Characteristics[2]						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	1.7	-	
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=20V f=1.0MHz	-	1317	-	pF
Output capacitance	C_{OSS}		-	163	-	
Reverse transfer capacitance	C_{RSS}		-	131	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DD}=15V, R_L=20Ω, I_D=15A, R_G=3.3Ω	-	4.6	-	ns
Turn-on Rise time	tr		-	12.2	-	
Turn-off delay time	$t_{D(OFF)}$		-	26.6	-	
Turn-off Fall time	tf		-	8	-	
Total gate charge	Q_g	V_{GS}=4.5V,I_D=15A V_{DS}=15V	-	12.6		nC
Gate-source charge	Q_{gs}			4.2		
Gate-drain charge	Q_{gd}		-	5.1	-	
Drain-Source Diode Characteristics						
Diode forward voltage	V_{SD}	I_{SD}=50A,V_{GS}=0V	-	0.8	1.1	V

Note: 1：Pulse test; pulse width ≦ 300ns, duty cycle ≦ 2%.

2：Guaranteed by design, not subject to production testing.

Thermal Characteristics

Parameter	Symbol	Typical	Unit
Thermal Resistance-Junction to Case	Rθjc	1.7	℃/W
Thermal Resistance junction-to ambient	Rθja	62.5	

Typical Performance Characteristics

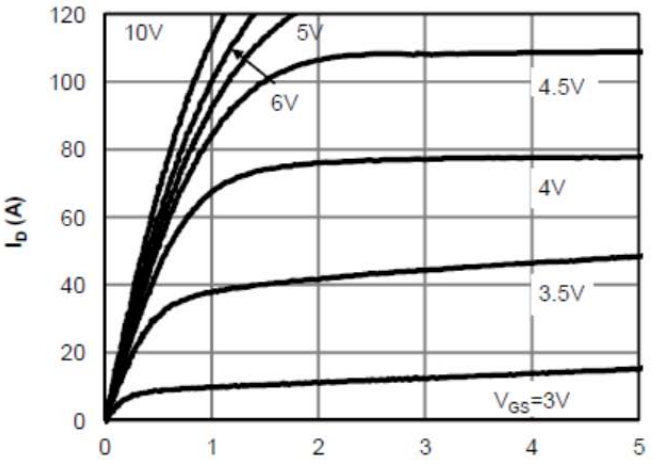


Fig 1: On-Region Characteristics (Note E)

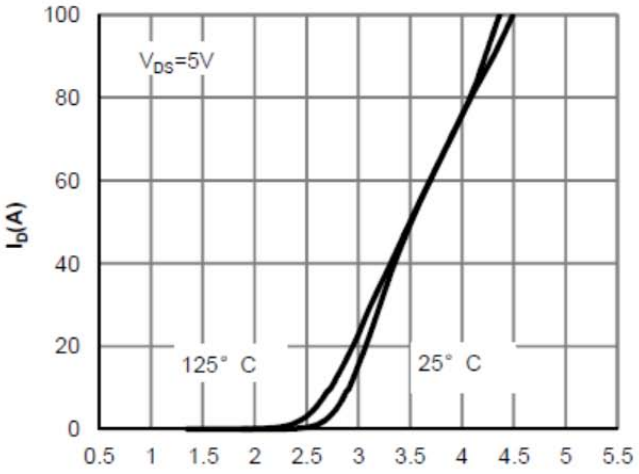


Figure 2: Transfer Characteristics (Note E)

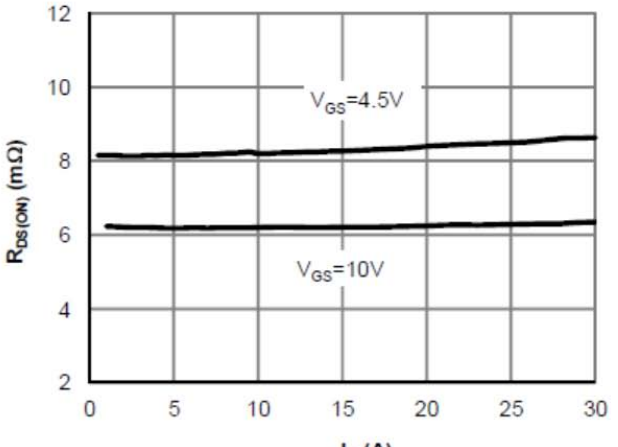


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

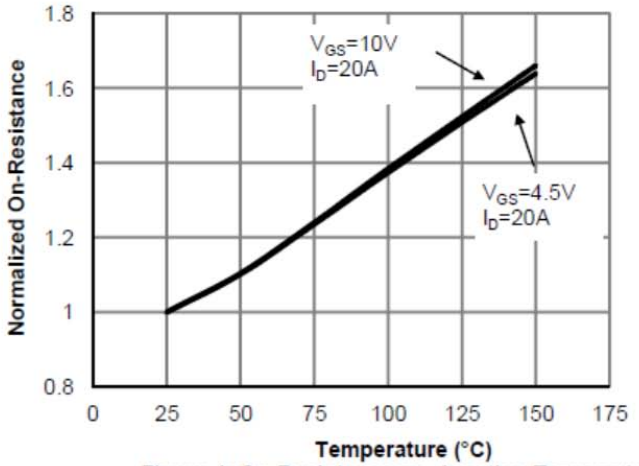


Figure 4: On-Resistance vs. Junction Temperature (Note E)

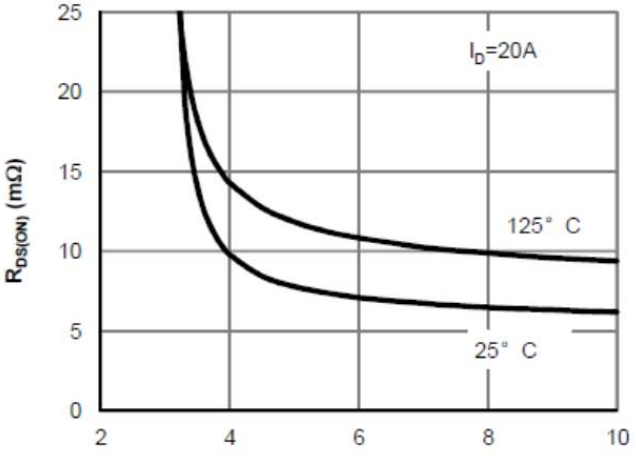


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

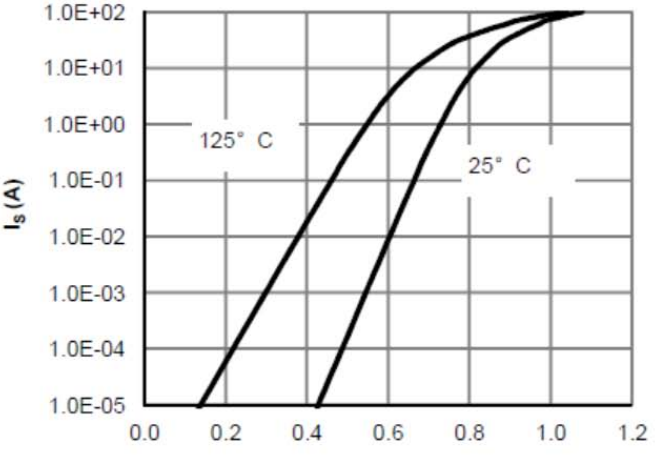


Figure 6: Body-Diode Characteristics (Note E)

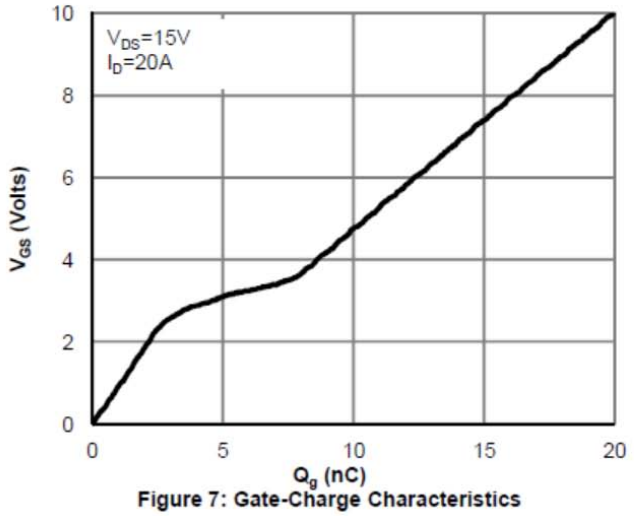


Figure 7: Gate-Charge Characteristics

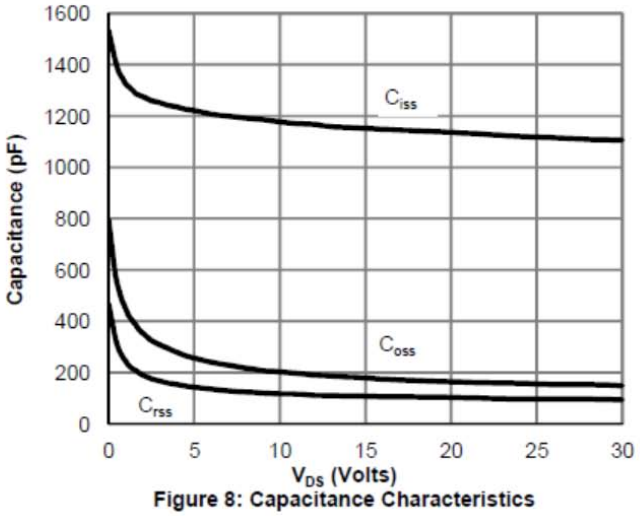


Figure 8: Capacitance Characteristics

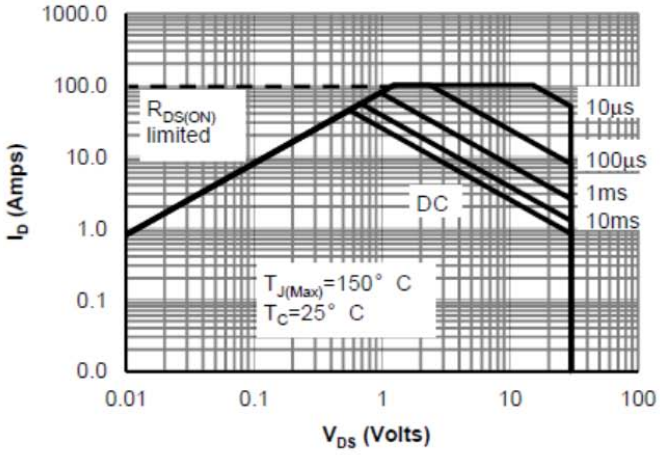


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

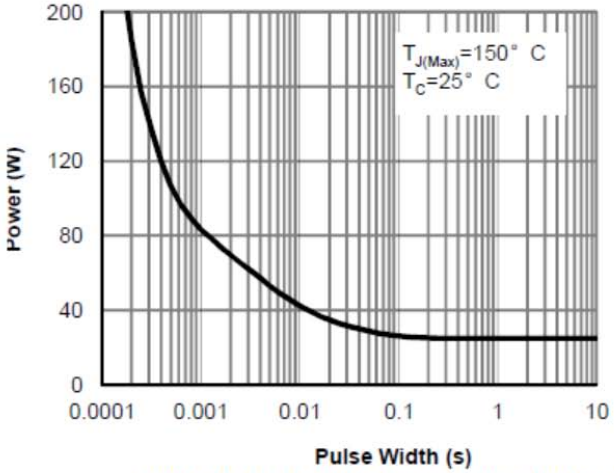


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

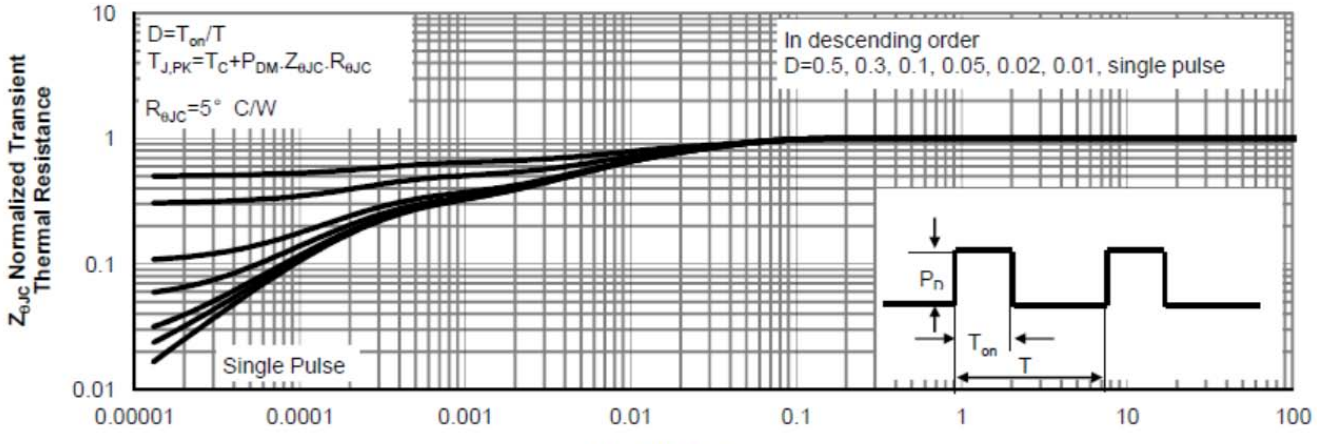


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

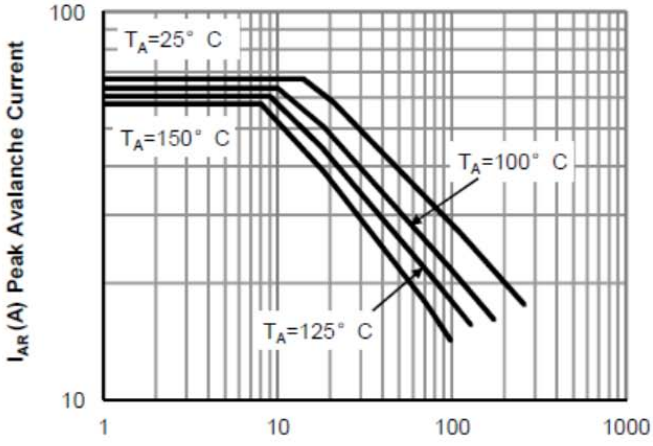


Figure 12: Single Pulse Avalanche capability (Note C)

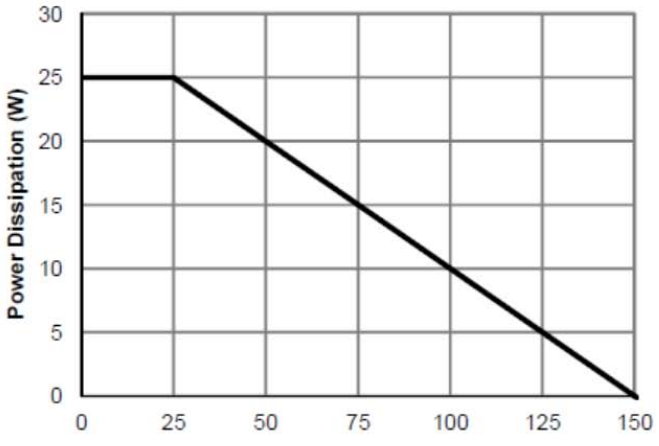


Figure 13: Power De-rating (Note F)

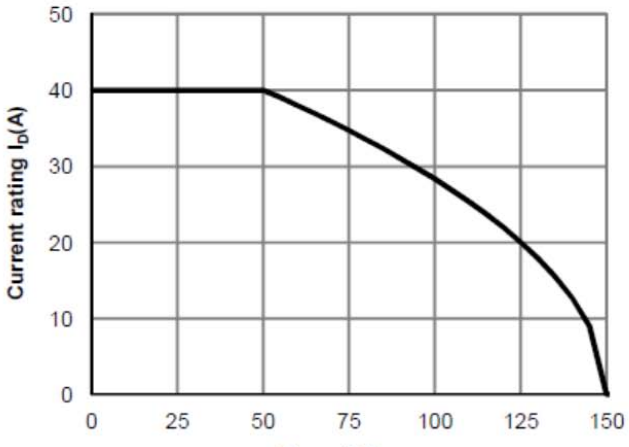


Figure 14: Current De-rating (Note F)

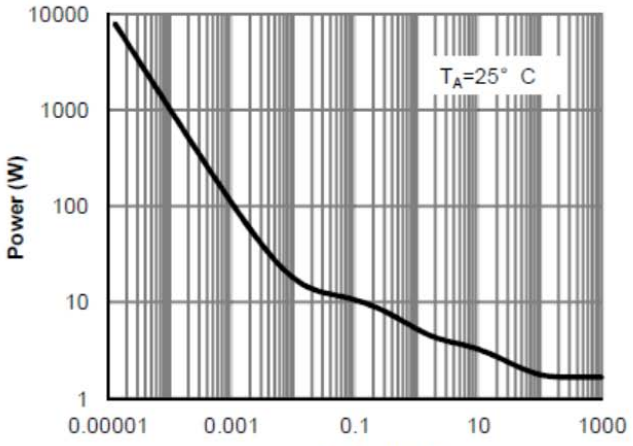


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

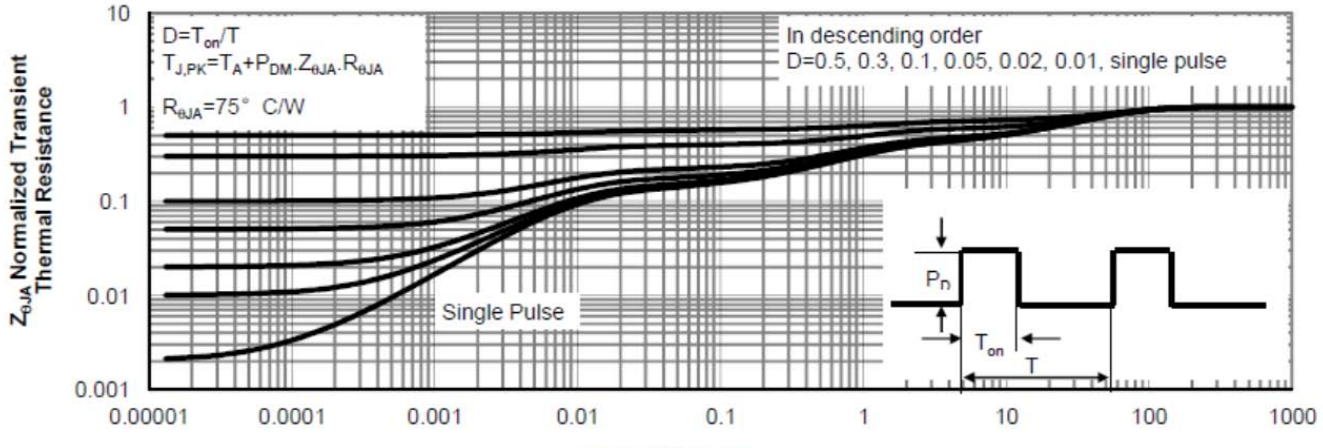
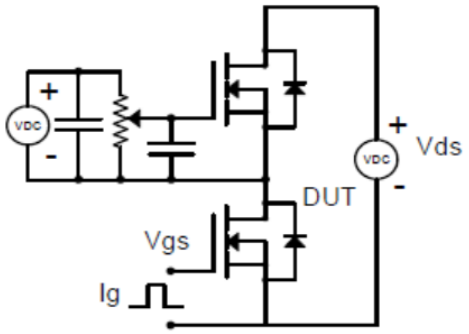
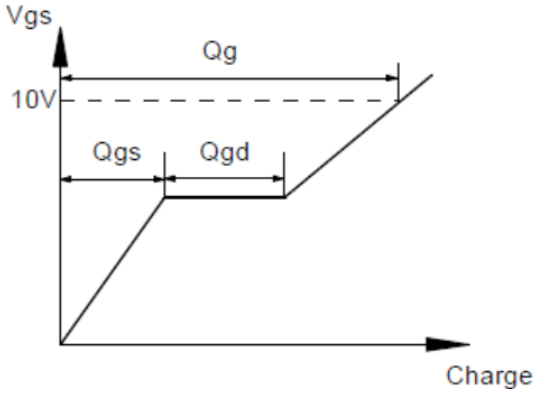


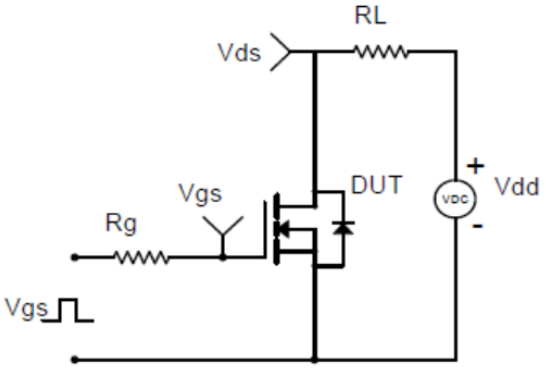
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

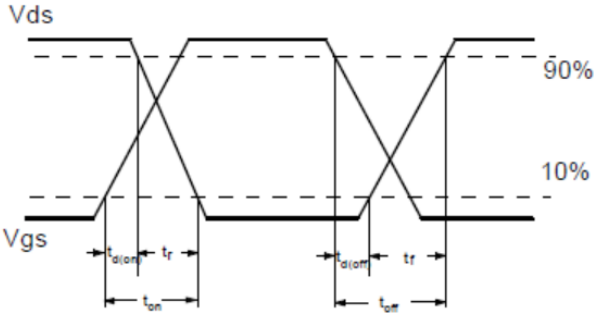
Gate Charge Test Circuit & Waveform



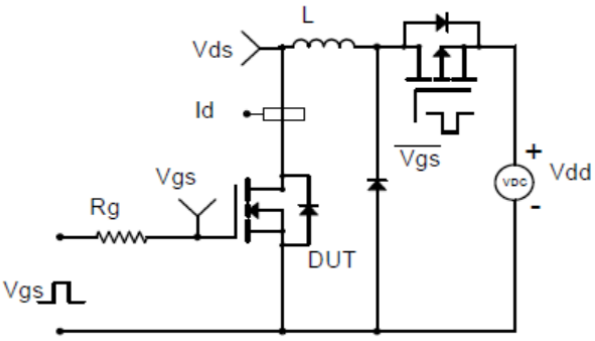


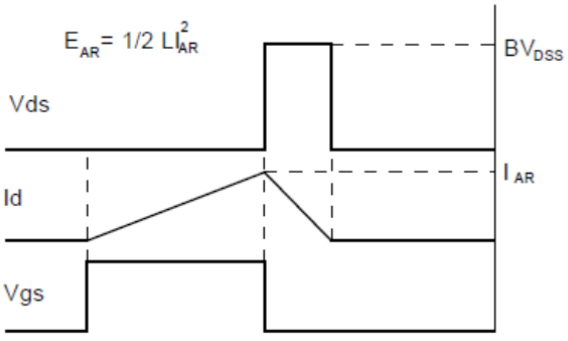
Resistive Switching Test Circuit & Waveforms



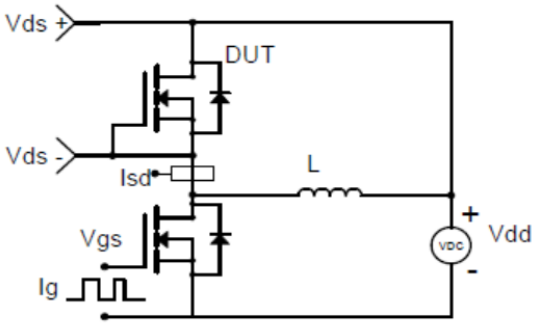


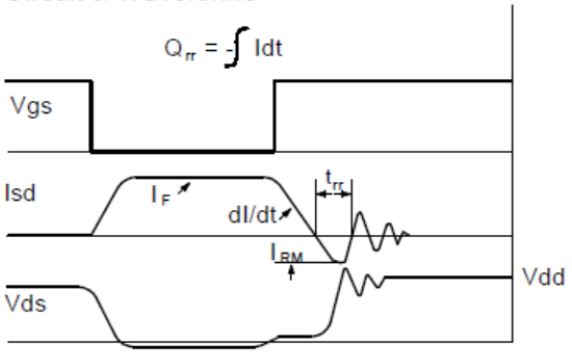
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





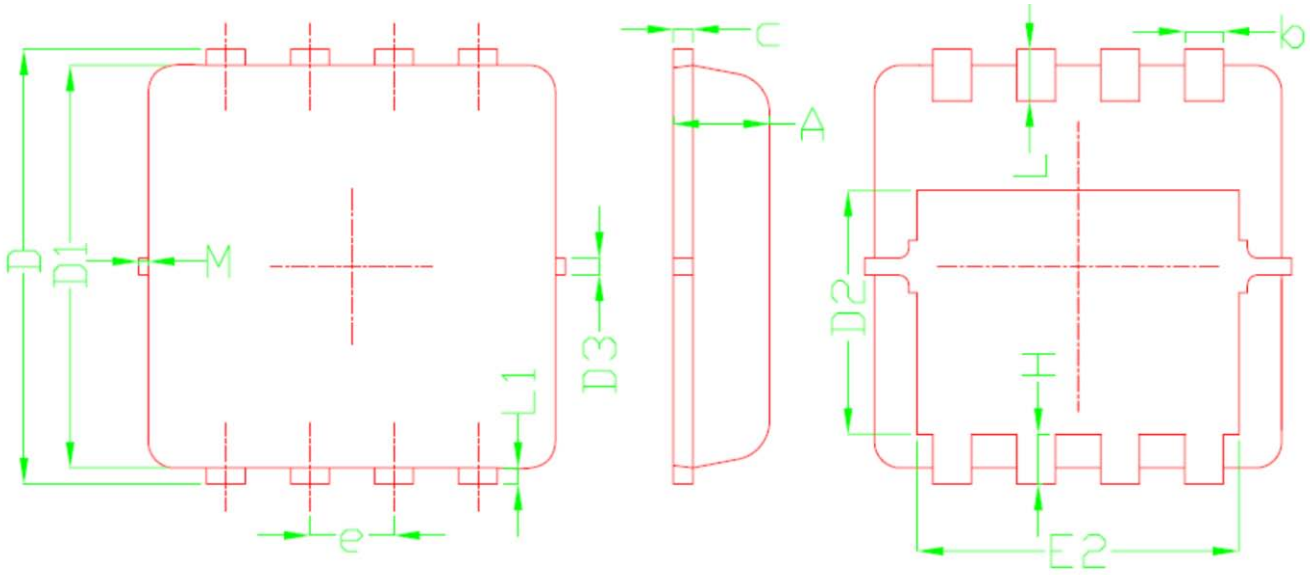
Diode Recovery Test Circuit & Waveforms

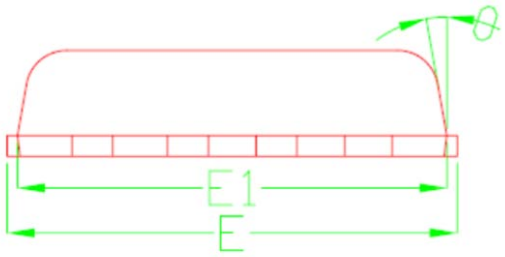


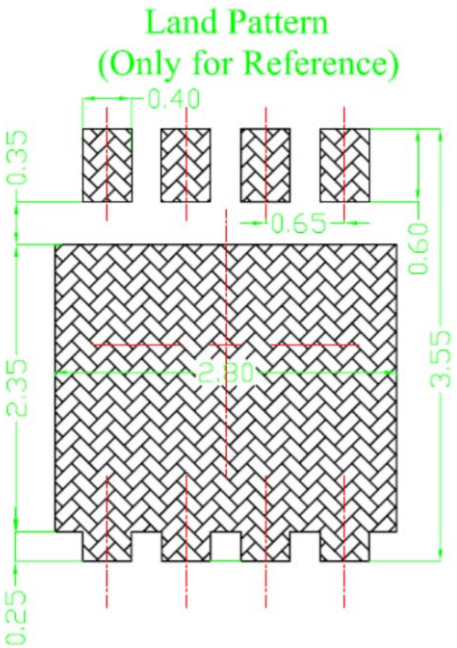


Package Information

- **DFN3×3-8L**







SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	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
* Not specified			