

## Product Summary

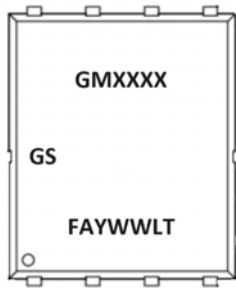
$V_{DS}$ (V)	$R_{DS(on),max}$ (mΩ)	$I_D$ (A)
30	1.7 @ $V_{GS} = 10V$	119 <sup>(1)</sup>

## Features

- Low  $R_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

## Application

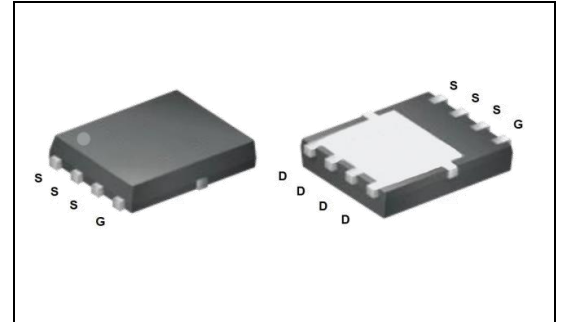
- DC/DC conversion
- Power switch
- Motor drives
- Li- Battery Protection



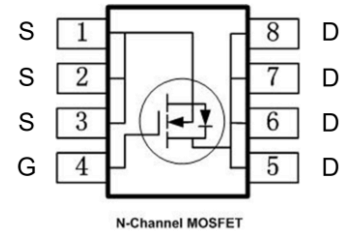
PDFN3333

NOTE:  
 LOGO - GS  
 GMXXXXX- Part number code  
 F - Fab location code  
 A - Assembly location code  
 Y - Year code  
 WW - Week code  
 L&T - Assembly lot code

PDFN3333



Equivalent circuit



## Absolute maximum rating@25°C

Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{DS}$	30	V
Gate-source voltage	$V_{GS}$	±20	
Continuous drain current	$T_C=25^{\circ}C^{(1)}$	$I_D$ 119	A
	$T_C=100^{\circ}C^{(1)}$	75	
Pulsed drain current <sup>(2)</sup>	$I_{D,pulse}$	475	
Avalanche energy, single pulse <sup>(3)</sup>	$E_{AS}$	270	mJ
Power dissipation	$T_C=25^{\circ}C$	$P_D$ 38	W
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to 150	°C

## Thermal Characteristic

Parameter	Symbol	Max.	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	3.3	°C/W
Thermal resistance, junction-to-ambient <sup>(4)</sup>	$R_{\theta JA}$	60	

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Static parameter						
Drain to source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA	30			V
Gate-source threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.2	1.6	2.5	V
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V			±100	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1	μA
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A		1.3	1.7	mΩ
	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 30 A		2.0	2.3	mΩ
Forward transconductance <sup>(5)</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 30 A		33		S
Gate resistance	R <sub>g</sub>	f = 1 MHz		1.7		Ω
Dynamic <sup>(5)</sup>						
Total gate charge V <sub>GS</sub> = 10V	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V		39		nC
Gate-source charge	Q <sub>gs</sub>			7.2		
Gate-drain charge	Q <sub>gd</sub>			7.4		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V, R <sub>GEN</sub> = 3 Ω		5.4		ns
Rise time	t <sub>r</sub>			11		
Turn-off delay time	t <sub>d(off)</sub>			29		
Fall time	t <sub>f</sub>			12		
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		2517		pF
Output capacitance	C <sub>oss</sub>			1731		
Reverse transfer capacitance	C <sub>rss</sub>			142		
Reverse Diode Characteristics <sup>(5)</sup>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>F</sub> = 2 A		0.7	1.2	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs		46		ns
Reverse recovery charge	Q <sub>rr</sub>			37		nC

**Notes**

- (1) Limited by maximum junction temperature.
- (2) Pulse width limited by maximum junction temperature.
- (3) V<sub>DS</sub> = 15 V, V<sub>GS</sub> = 10 V, L = 1.0 mH.
- (4) Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
- (5) Guaranteed by design, not subject to production testing.

## Typical Performance Characteristics

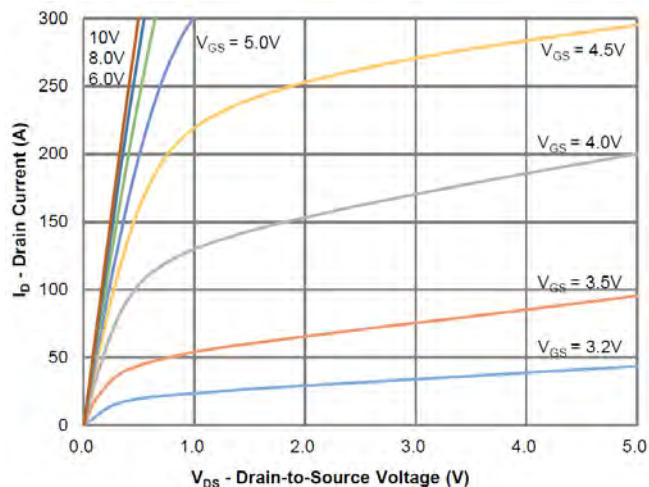


Figure 1: Output Characteristics

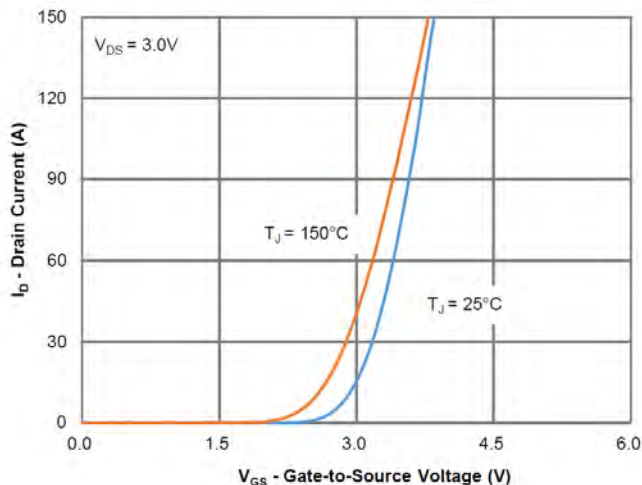


Figure 2: Transfer Characteristics

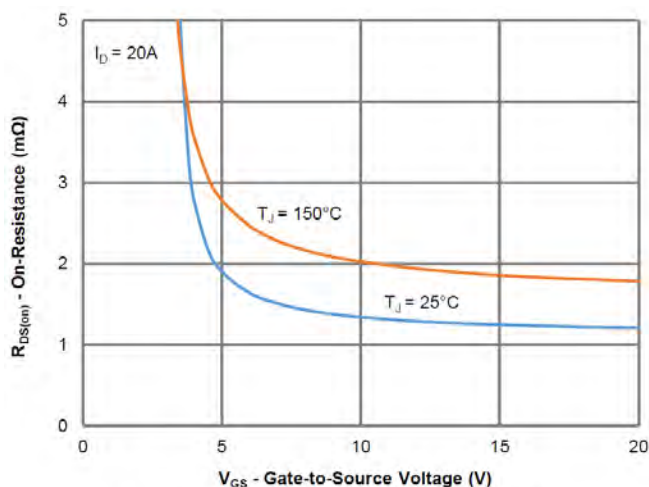


Figure 3: On-Resistance vs. Gate-Source Voltage

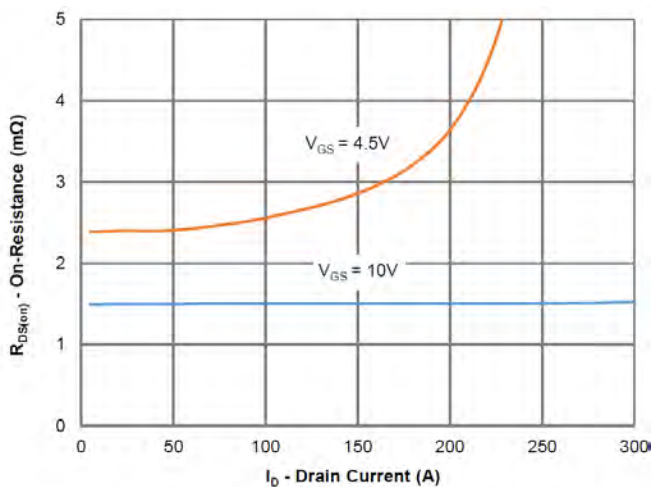


Figure 4: On-Resistance vs. Drain Current

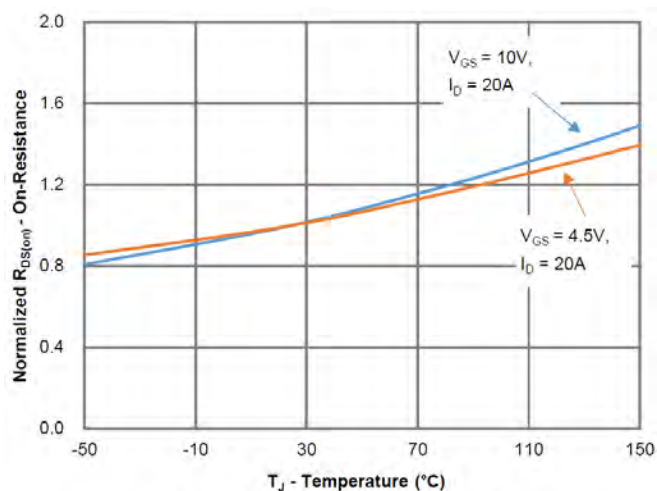


Figure 5: On-Resistance vs. Junction Temperature

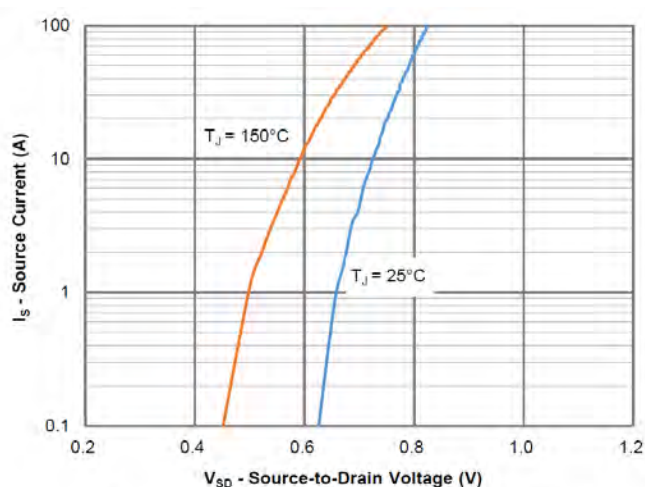


Figure 6: Source-Drain Diode Forward Voltage

## Typical Performance Characteristics

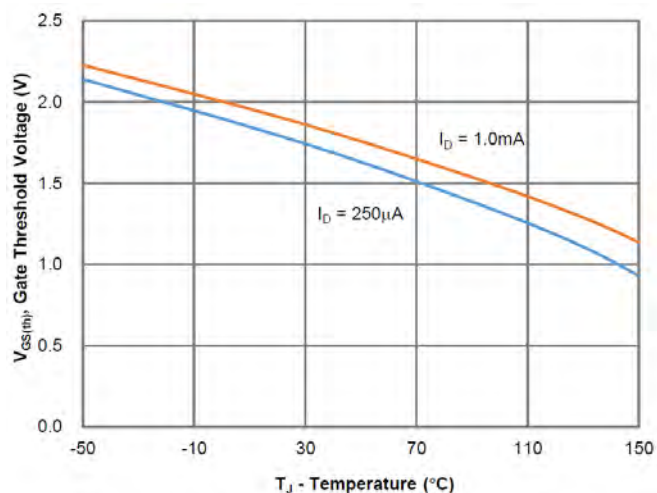


Figure 7: Gate Threshold Variation vs. Junction Temperature

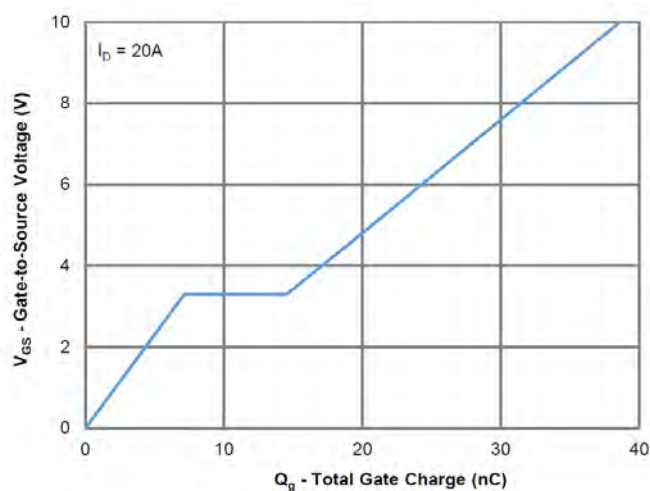


Figure 8: Gate Charge Characteristics

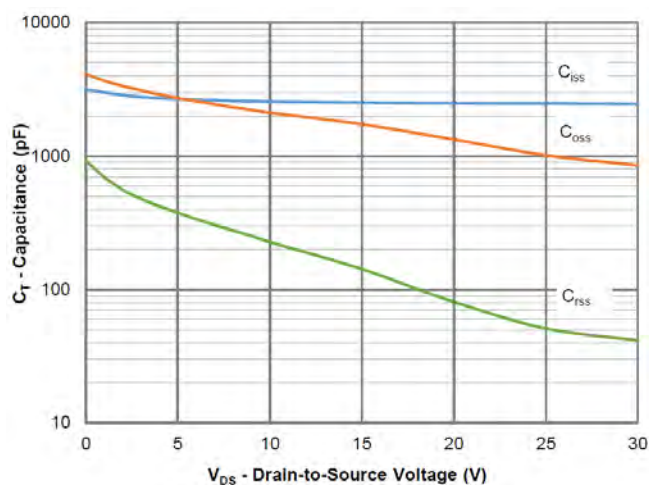


Figure 9: Capacitance Characteristics

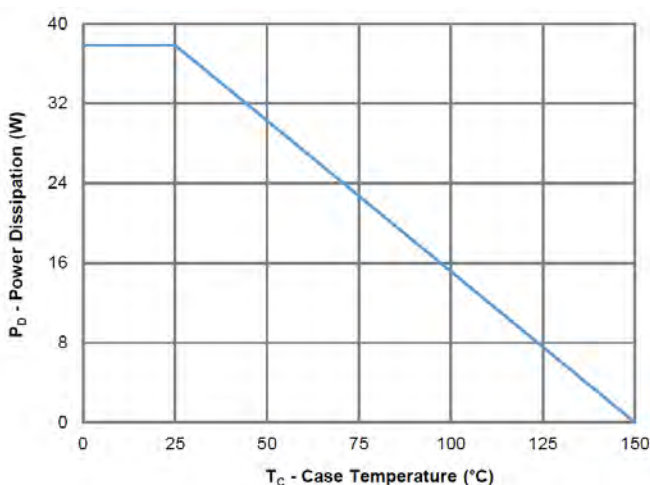


Figure 10: Power Derating

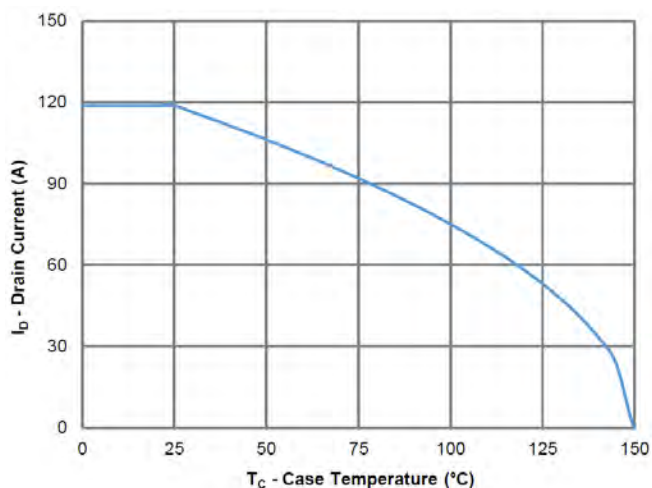


Figure 11: Current Derating

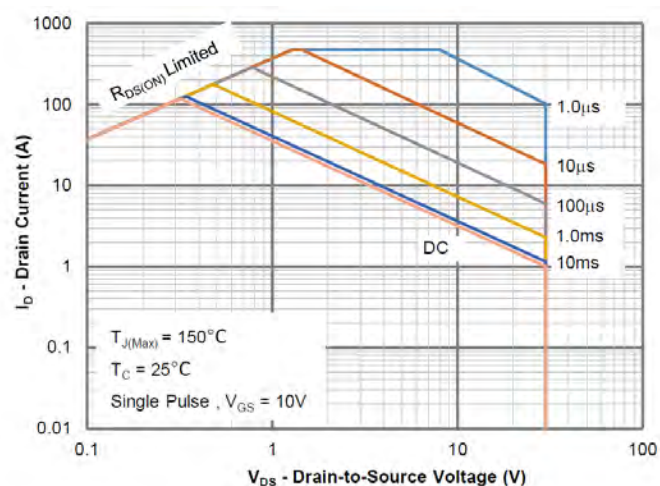


Figure 12: Safe Operating Area

## Typical Performance Characteristics

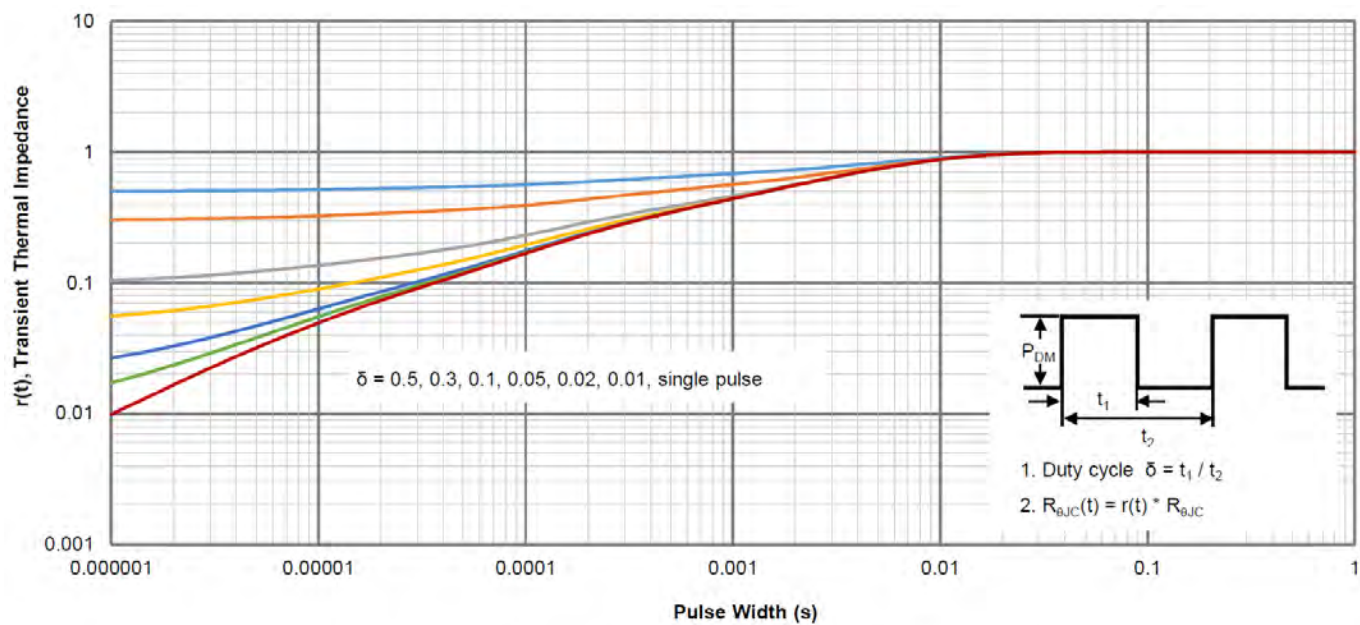
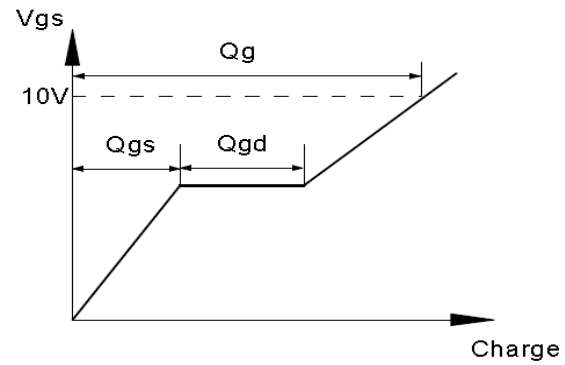
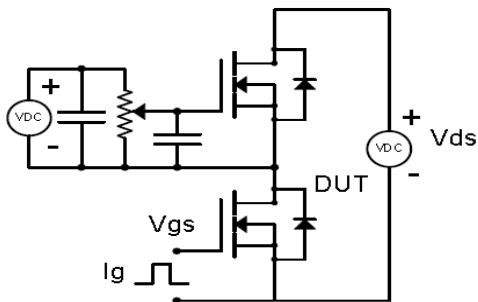


Figure 13: Normalized Maximum Transient Thermal Impedance

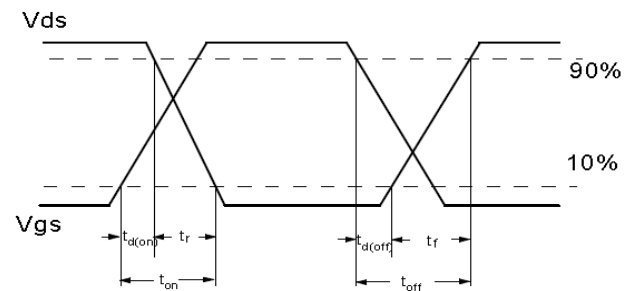
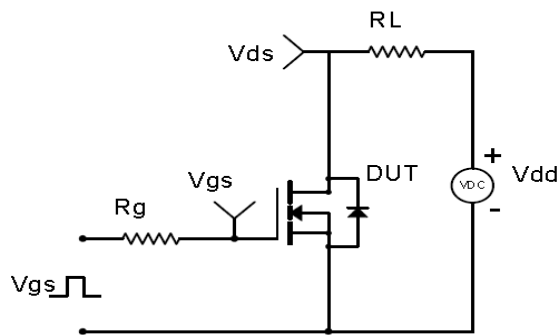


## Test Circuit & Waveform

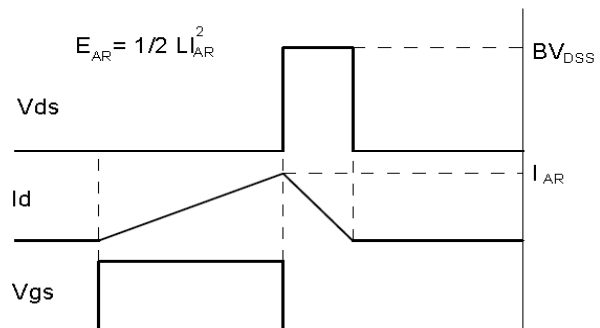
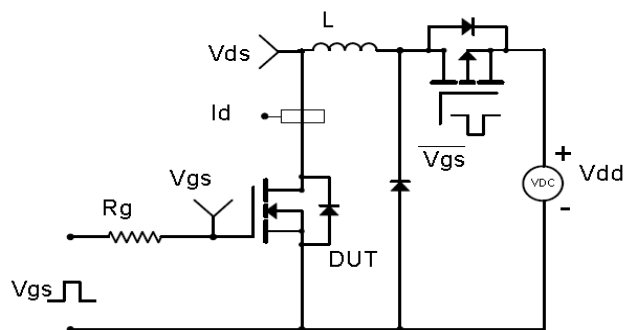
Gate Charge Test Circuit & Waveform



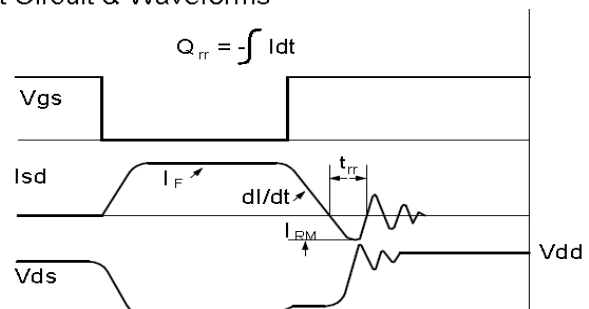
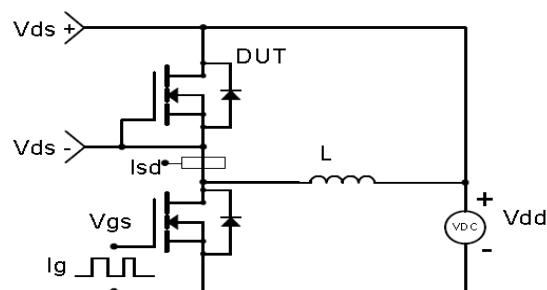
Resistive Switching Test Circuit & Waveforms

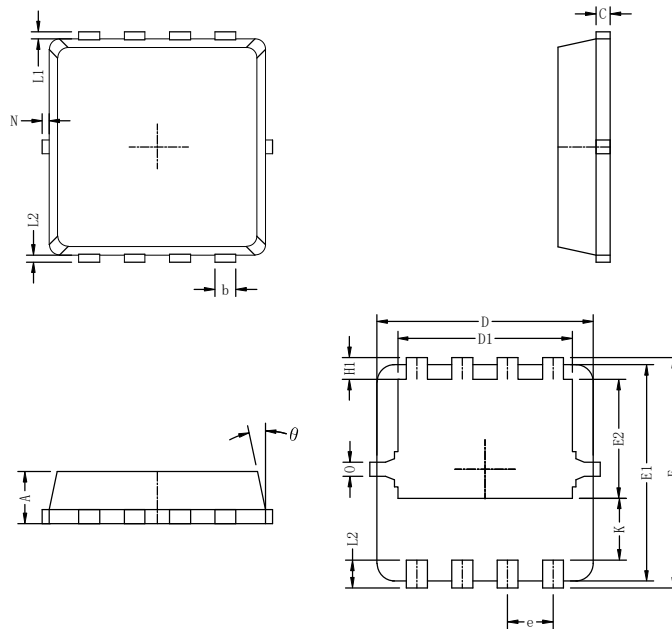


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Outline Drawing PDFN3333**


Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.65	0.75	0.85
b	0.25	0.30	0.35
C	0.15	0.20	0.25
D	3.00	3.10	3.20
D1	2.40	2.50	2.60
E	3.20	3.30	3.40
E1	3.00	3.10	3.20
E2	1.60	1.70	1.80
e	0.65 BSC.		
H1	0.21	0.31	0.41
H2	0.30	0.40	0.50
K	0.78	0.88	0.98
L1/L2	0.10 REF.		
$\theta$	11°	12°	13°
N	0	-	0.15
0	0.2 REF.		

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