

Features

- Uses CRM(CQ) advanced Trench technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

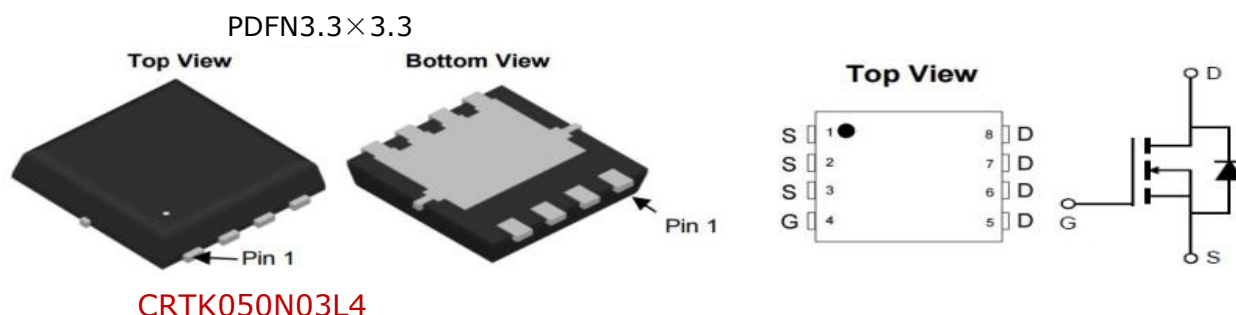
Product Summary

V_{DS}	30V
$R_{DS(on),typ}$	4.6mΩ
I_D	58A

Applications

- DC/DC Converter
- PWM Application
- high-frequency switching and synchronous rectification

100% DVDS Tested
100% Avalanche Tested



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRTK050N03L4	050N03	PDFN3.3x3.3	Tape&Reel	N/A	N/A	5000

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	30	V
Continuous drain current	I_D	58	A
$T_C = 25^\circ\text{C}$ (Silicon limit)		37	A
$T_C = 100^\circ\text{C}$ (Silicon limit)			
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D\ pulse}$	232	A
Avalanche energy, single pulse ($I_D = 18\text{A}$, $R_g = 25\Omega$) ^[1]	E_{AS}	81	mJ
Gate-Source voltage	V_{GS}	±20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	31	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	°C
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	°C

※. Notes:

1.EAS is tested at starting $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}$, $I_{AS} = 18\text{A}$, $V_{GS} = 10\text{V}$. The parameter is not subject to production testing-specified by design.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	4.0	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	42.5	

Electrical Characteristic (at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	30	-	-	V	$V_{GS}=0V, I_D=250\mu A$
		30	-	-	V	$V_{GS}=0V, I_D=1mA$
Gate threshold voltage	$V_{GS(th)}$	1.0	1.4	2.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=30V, V_{GS}=0V$ $T_j=25^{\circ}\text{C}$
		-	-	100		$T_j=125^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	0	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	4.6	5.5	mΩ	$V_{GS}=10V, I_D=19A$
		-	6.2	7.8		$V_{GS}=4.5V, I_D=19A$
Transconductance	g_{fs}	-	72.0	-	S	$V_{DS}=5V, I_D=19A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	1531	-	pF	$V_{GS}=0V, V_{DS}=15V, f=1MHz$
Output Capacitance	C_{oss}	-	146	-		
Reverse Transfer Capacitance	C_{rss}	-	164	-		
Gate Total Charge	Q_G	-	36.2	-	nC	$V_{GS}=10V, V_{DS}=15V, I_D=19A$
Gate-Source charge	Q_{gs}	-	6.6	-		
Gate-Drain charge	Q_{gd}	-	6.4	-		
Turn-on delay time	$t_{d(on)}$	-	6.0	-	ns	$V_{GS}=10V, V_{DD}=15V,$ $R_{G_ext}=2.7\Omega$
Rise time	t_r	-	26.8	-		
Turn-off delay time	$t_{d(off)}$	-	31.0	-		
Fall time	t_f	-	9.6	-		
Gate resistance	R_G	-	1.6	-	Ω	$V_{GS}=0V, V_{DS}=0V, f=1MHz$

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	0.82	1.4	V	$V_{GS}=0V, I_{SD}=19A$
Body Diode Reverse Recovery Time	t_{rr}	-	9.3	-	ns	$I_F=19A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	2.7	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

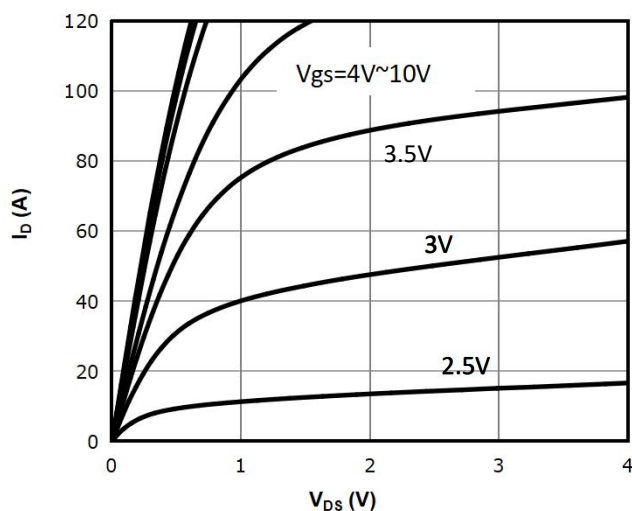


Fig 2: Transfer Characteristics

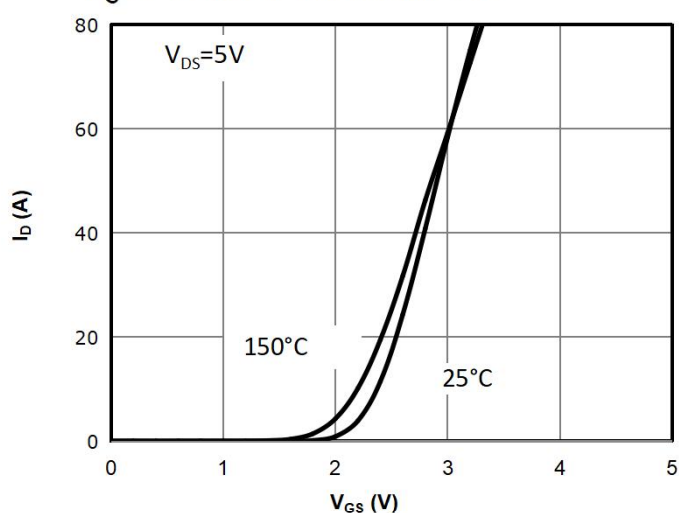


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

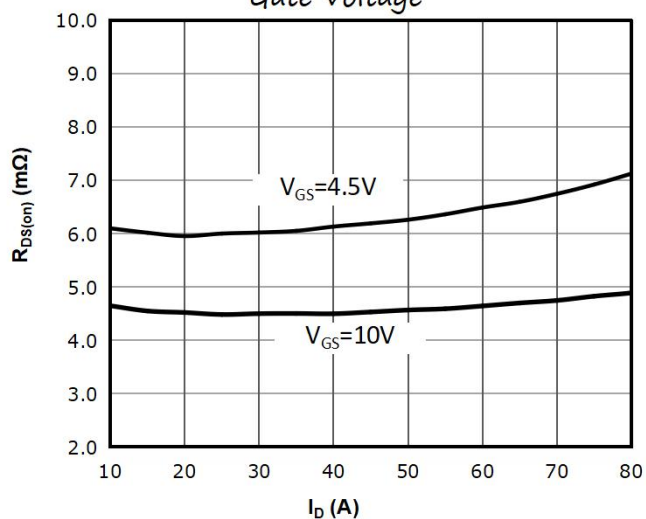


Fig 4: $R_{DS(on)}$ vs Gate Voltage

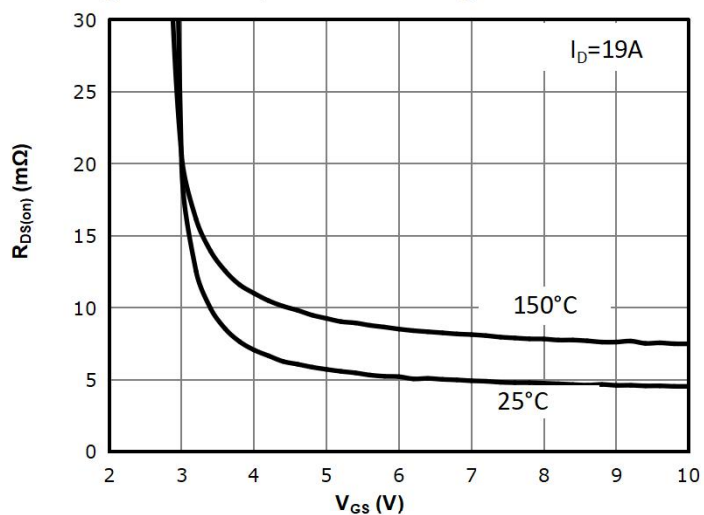


Fig 5: $R_{DS(on)}$ vs. Temperature

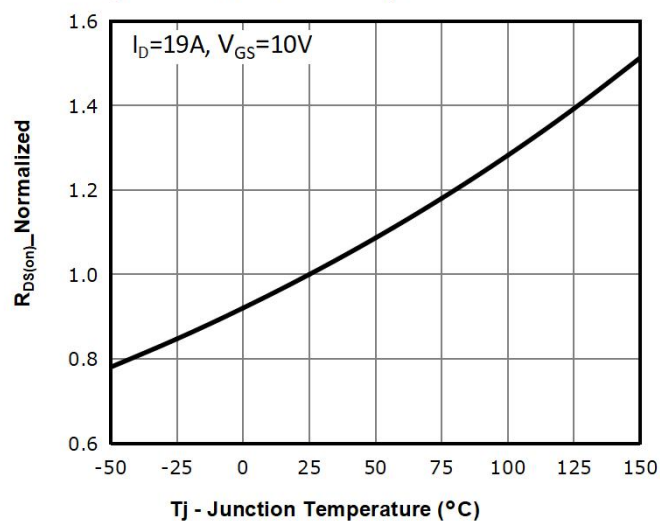


Fig 6: $V_{GS(th)}$ vs. Temperature

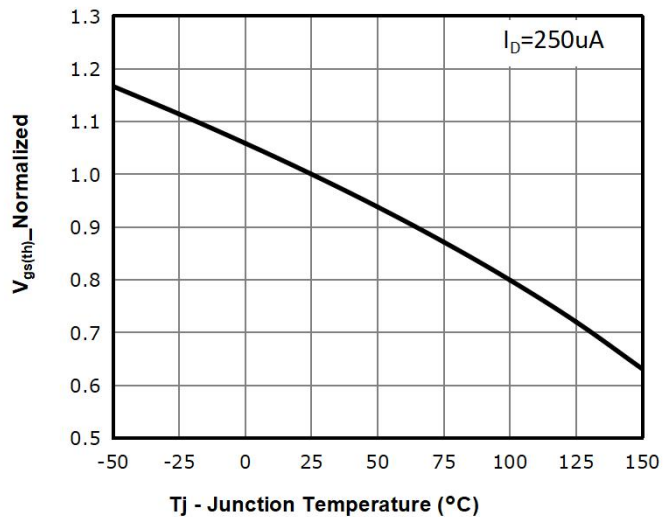


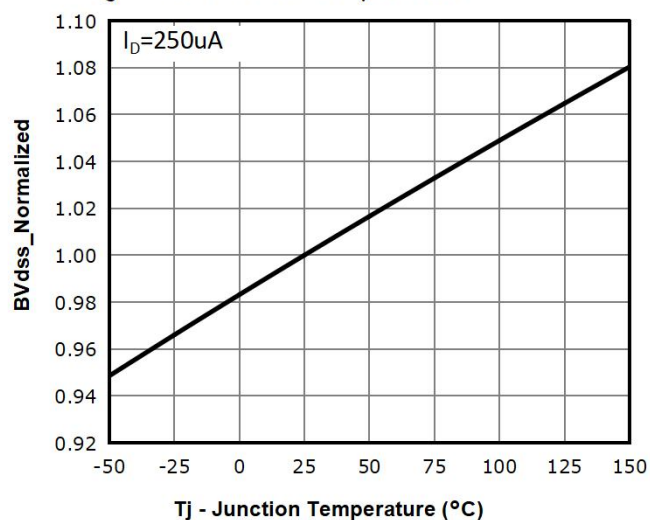
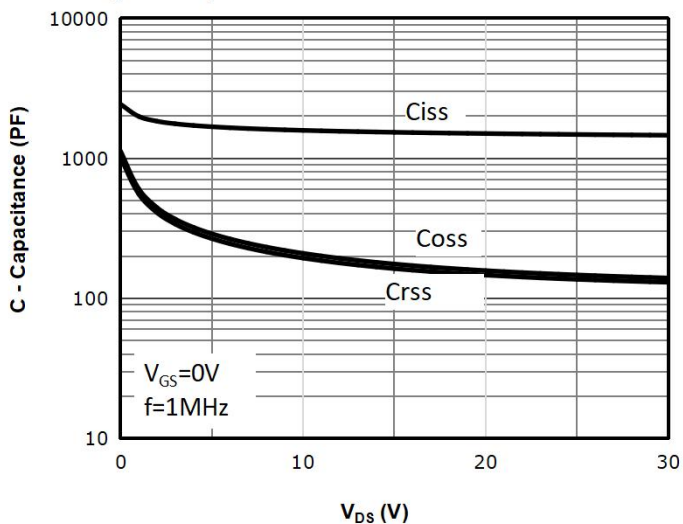
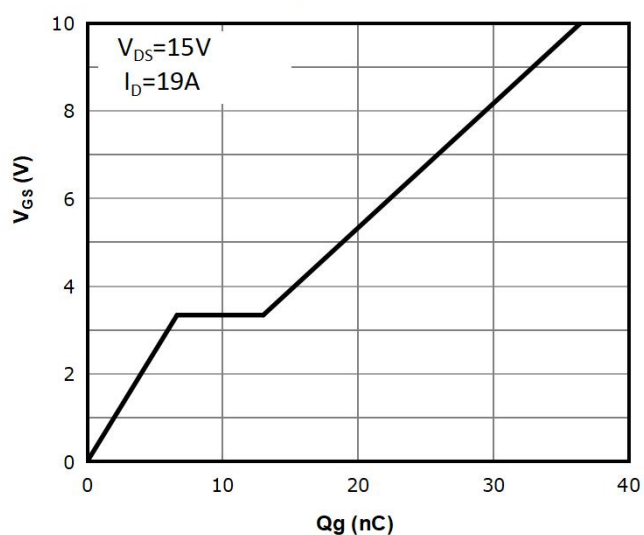
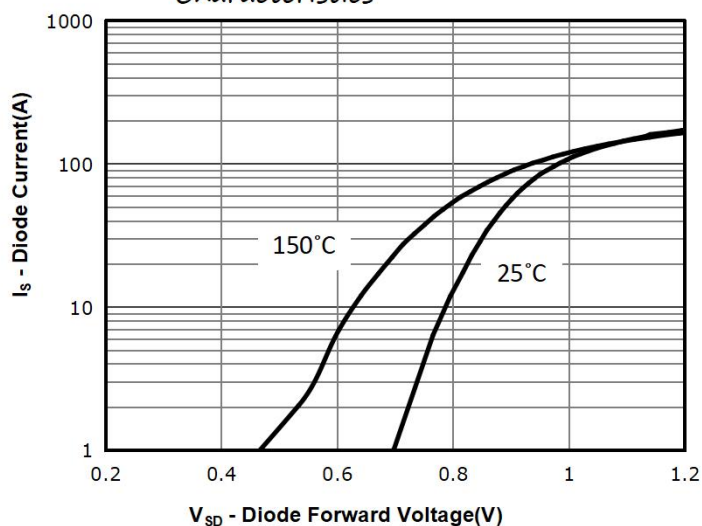
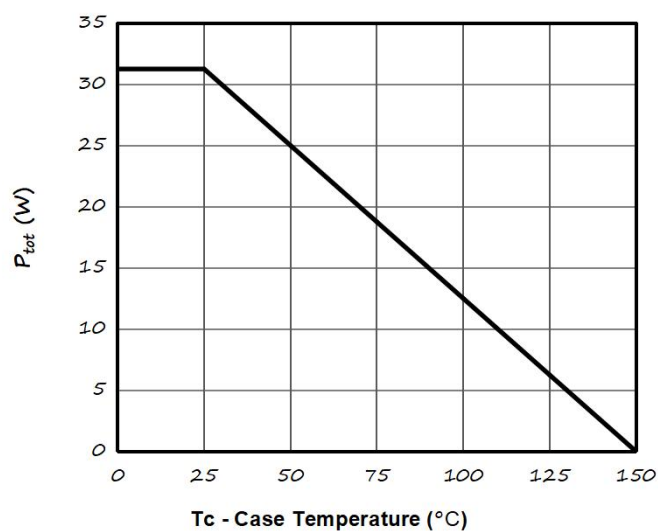
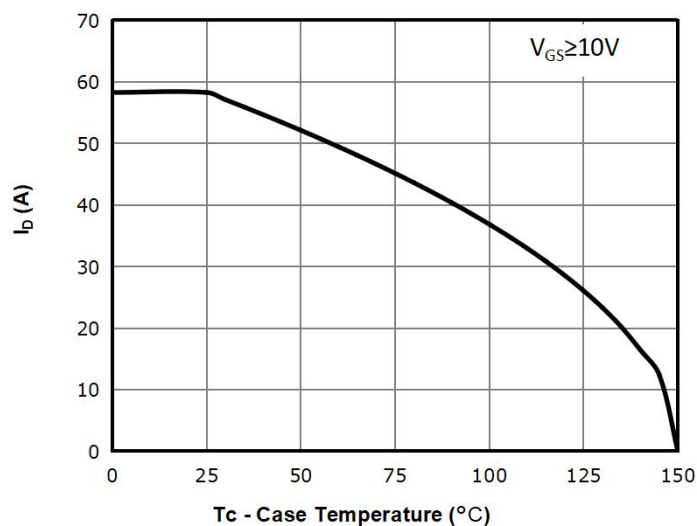
Fig 7: BV_{dss} vs. Temperature

Fig 8: Capacitance Characteristics

Fig 9: Gate Charge Characteristics

Fig 10: Body-diode Forward Characteristics

Fig 11: Power Dissipation

Fig 12: Drain Current Derating


Fig 13: Safe Operating Area

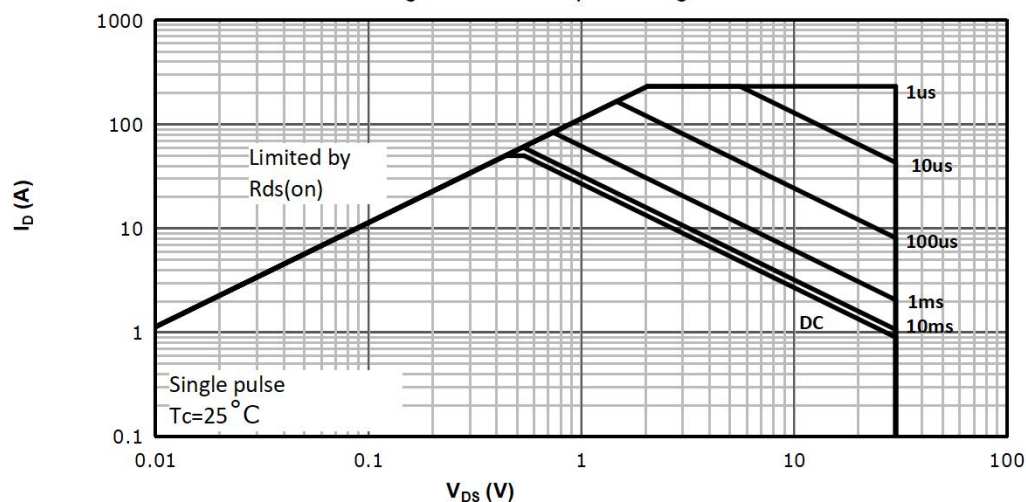
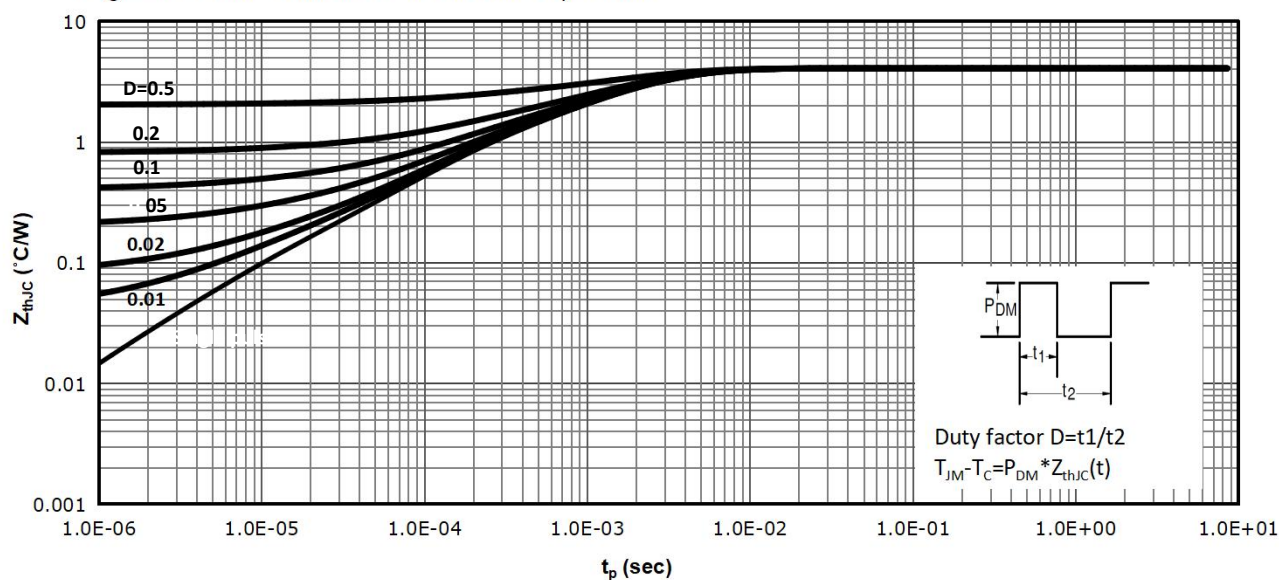
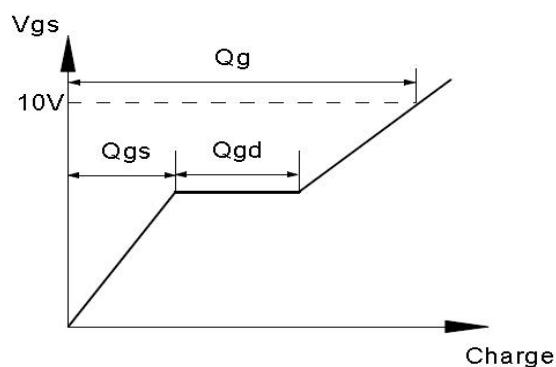
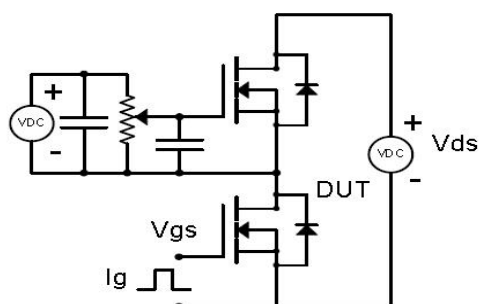


Fig 14: Max. Transient Thermal Impedance

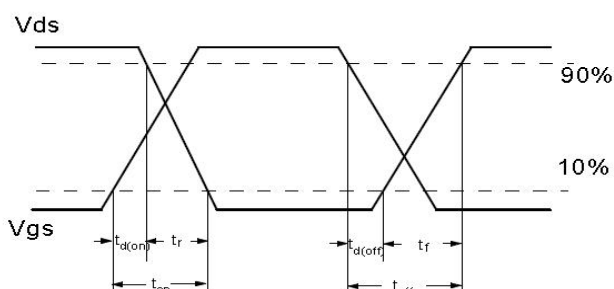
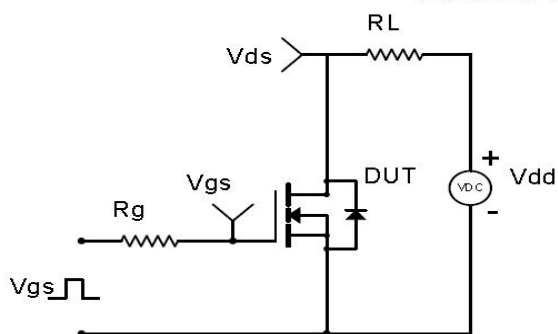


Test Circuit & Waveform

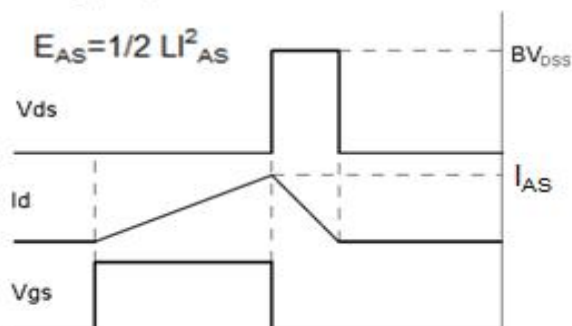
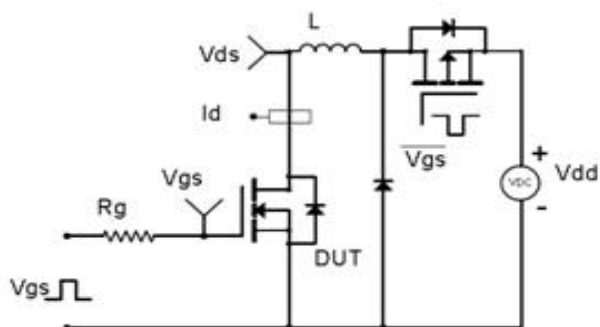
Gate Charge Test Circuit & Waveform



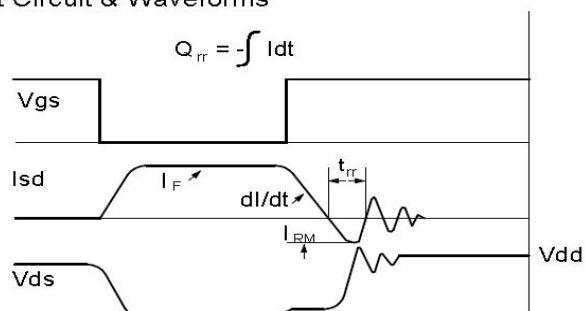
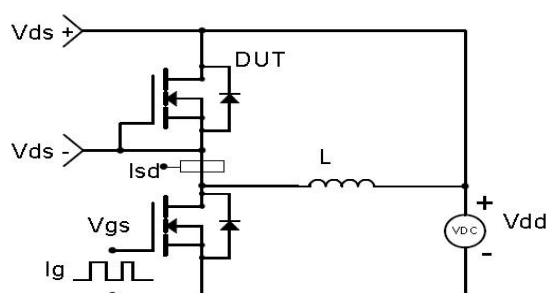
Resistive Switching Test Circuit & Waveforms

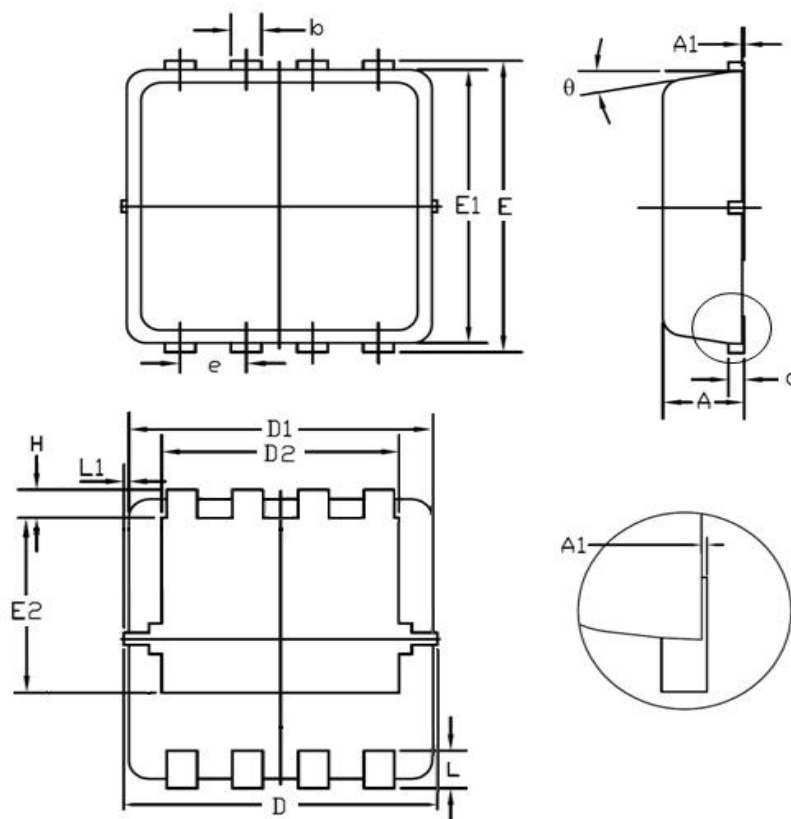


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

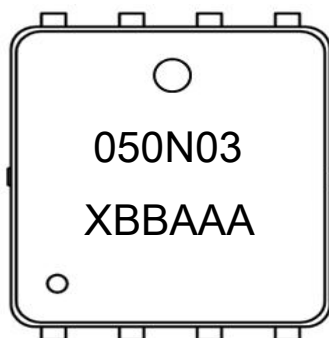


Diode Recovery Test Circuit & Waveforms



Package Outline: PDFN3.3×3.3


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.70	0.90	0.028	0.035
A1	0.00	0.05	0.000	0.002
b	0.20	0.43	0.008	0.017
c	0.10	0.25	0.004	0.010
D	3.00	3.45	0.118	0.136
D1	2.90	3.30	0.114	0.130
D2	1.98	2.65	0.078	0.104
E	3.10	3.45	0.122	0.136
E1	2.80	3.20	0.110	0.126
E2	1.32	1.98	0.052	0.078
e	0.65 BSC		0.026 BSC	
H	0.28	0.65	0.011	0.026
L	0.30	0.65	0.012	0.026
L1	0.13		0.005	
θ	0°	14°	0°	14°

Marking

NOTE:
XBBAAA

X	—Assembly location code
BB	—Fab code
AAA	—Lot code

**Revision History**

Revision	Date	Major changes
1.0	2025/6/18	Release of Preliminary version.
2.0	2025/9/11	Modify package information

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

CRM(CQ) reserves the right to improve product design, function and reliability without notice.