RTP4115
150V Single N-Channel Trench MOSFET

Description

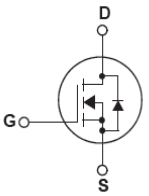
The RTP4115 MOSFET uses advanced trench MOSFET technology, that is uniquely optimized to provide the most efficient high frequency switching performance and low on-state resistance.

This device can be used in various power switching circuit for system miniaturization and higher efficiency.

Features

- Fast switching
- Breakdown Voltage VDS = 150V
- ID (at Vgs=10V) = 105A
- Typ. RDS(on) = 9.8mΩ
- Low Gate Charge
- 100% avalanche tested

RTP4115



Absolute Maximum Ratings

Symbol	Parameter	RTP4115	Unit
V_{DS}	Drain-Source Voltage	150	V
I_D	Drain Current -Continuous (Tc = 25℃) -Continuous (Tc = 100℃)	105* 75*	A
I_{DM}	Drain Current - Pulsed (Note 1)	420*	A
V_{GS}	Gate-Source voltage	±30V	V
E_{AS}	Single Pulse Avalanche Energy (Note 2)	1000	mJ
I_{AS}	Avalanche Current (Note 2)	90	A
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5	V/nS
P_D	Power Dissipation - Tc = 25℃	305	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	℃
T_L	Maximum Lead Temperature for Soldering	300	℃

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	RTP4115	Unit
$R_{\theta JA}$	Thermal Resistance Junction-to-Ambient	60	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-to-Case	0.41	℃/W

Electrical Characteristics TJ = 25℃ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA, T_J = 25℃	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 150V, V_{GS} = 0V, T_J = 25℃	-	-	1	μA
		V_{DS} = 120V, V_{GS} = 0V, T_J = 125℃	-	-	100	
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	-	-	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	-	-	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	3.6	4.4	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 50A	-	9.8	11	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 50V, I_D = 50A	100	-	-	S
Rg	Gate resistance	VGS=0V, V_{DS} open, f=1MHz	-	1.5	-	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f=1MHz	-	7800	-	pF
C_{oss}	Output Capacitance		-	500	-	
C_{rss}	Reverse Transfer Capacitance		-	210	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 50V, R_G = 2.5Ω, V_{GS} = 10V, I_D = 40A (Note 4, 5)	-	45	-	ns
t_r	Turn-On Rise Time		-	70	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	110	-	ns
t_f	Turn-Off Fall Time		-	90	-	ns
Q_g	Total Gate Charge	V_{DS} = 100V, I_D = 40A, V_{GS} = 10V (Note 4, 5)	-	200	-	nC
Q_{gs}	Gate-Source Charge		-	28	-	nC
Q_{gd}	Gate-Drain Charge		-	60	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		-	-	105	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	420	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 50A	-	0.9	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, V_{DS} = 100V I_S = 60A, dI_F/dt =100A/μs	-	135	-	ns
Q_{rr}	Reverse Recovery Charge		-	0.8	-	μC
I_{rrm}	Peak Reverse Recovery Current		-	12	-	A

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature TJ(MAX)=150°C. Ratings are based on low frequency and duty cycles to keep initial TJ=25°C.
2. VGS=10V, RG=25 Ω, ID=I_{AS}, VDD=50V, Starting TJ=25°C.
3. I_{SD}≤ID, di/dt ≤ 100A/us, V_{DD} ≤ BV_{DSS}, Starting TJ = 25 ℃
4. Pulse Test: Pulse width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

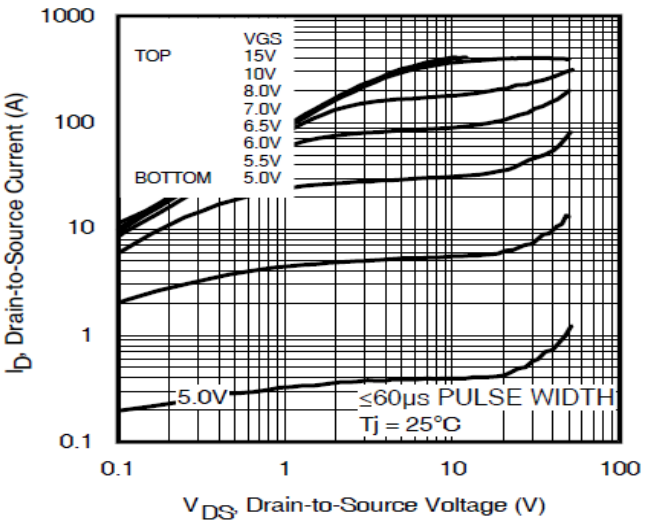


Figure 1: Typ. output characteristics

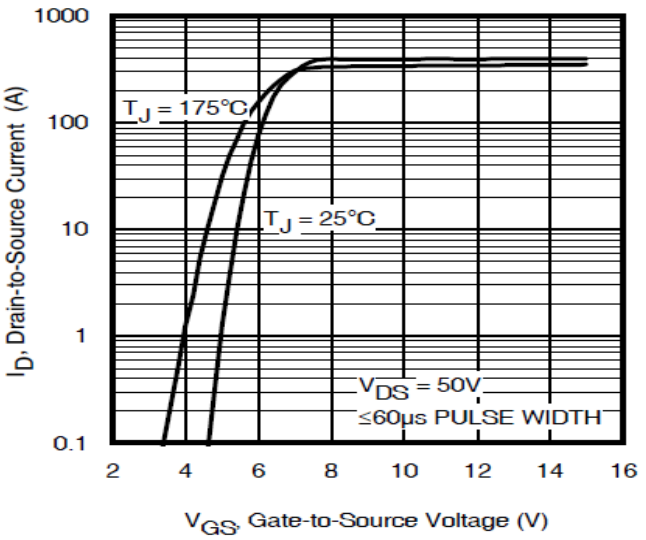


Figure 2: Typ. transfer characteristics

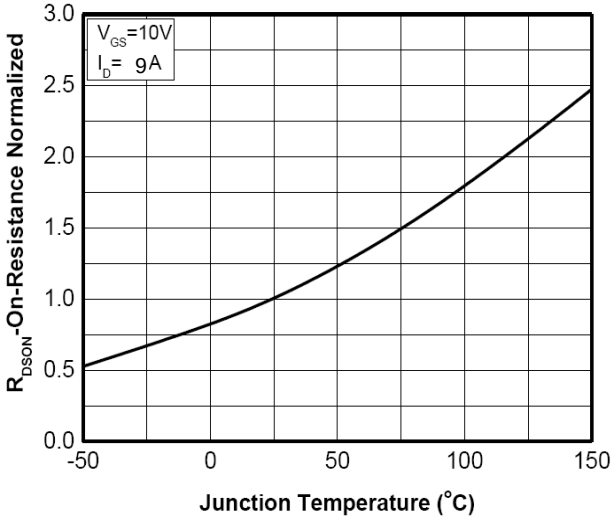


Figure 3: Normalized on resistance vs. temperature

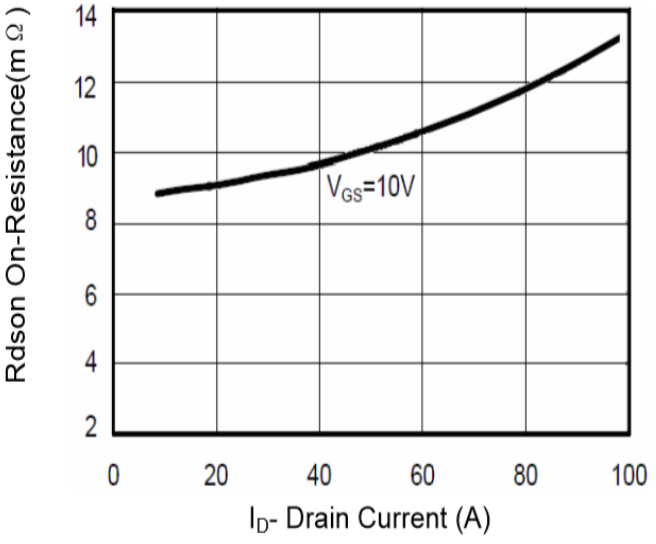


Figure 4: On-resistance vs. Drain current

Typical Performance Characteristics

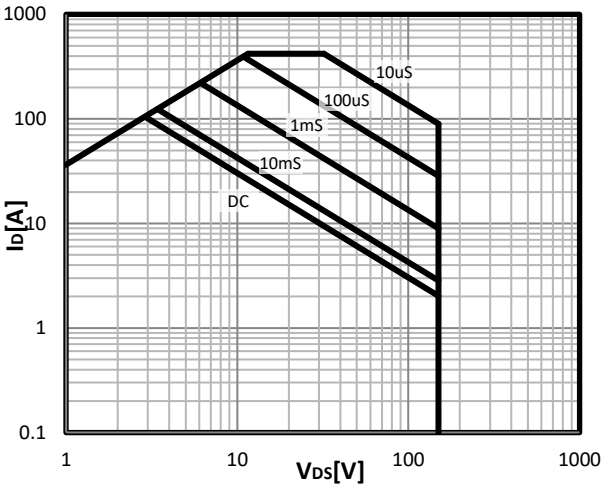


Figure 5: Maximum safe operating area

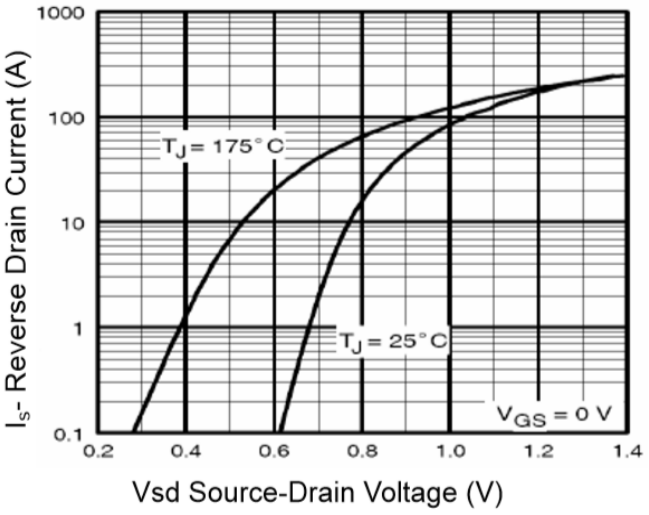


Figure 6: Forward characteristics of reverse diode

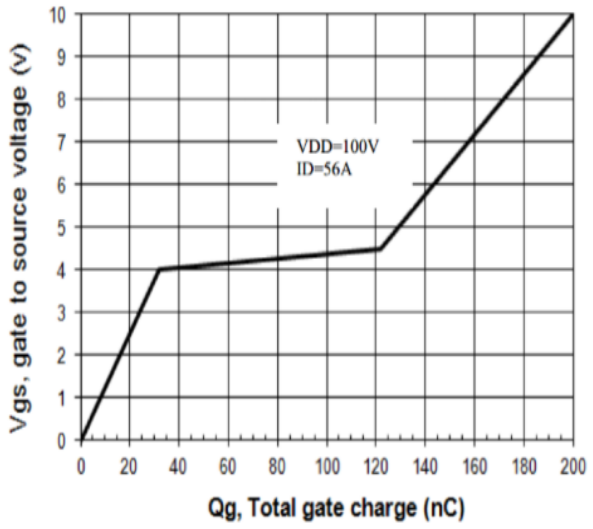


Figure 7: Typ. gate charge characteristics

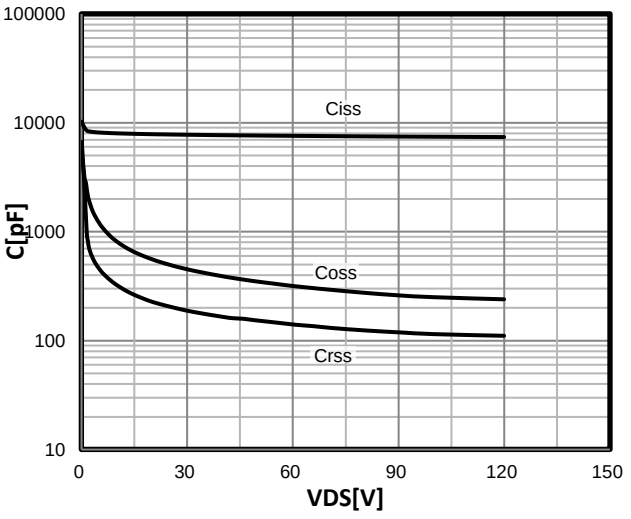


Figure 8: Capacitance characteristics

Typical Performance Characteristics

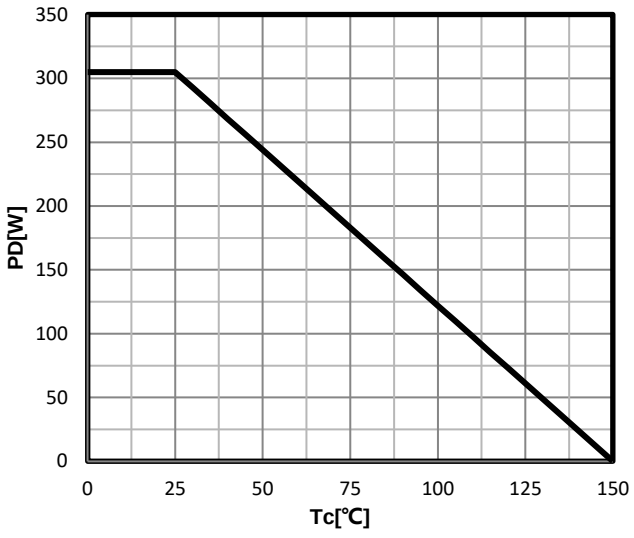


Figure 9: Max. power dissipation vs. case temperature

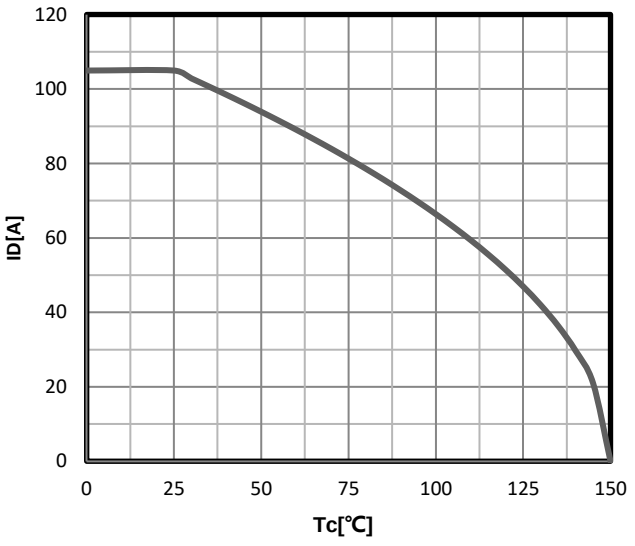


Figure 10: Continuous drain current vs. case temperature

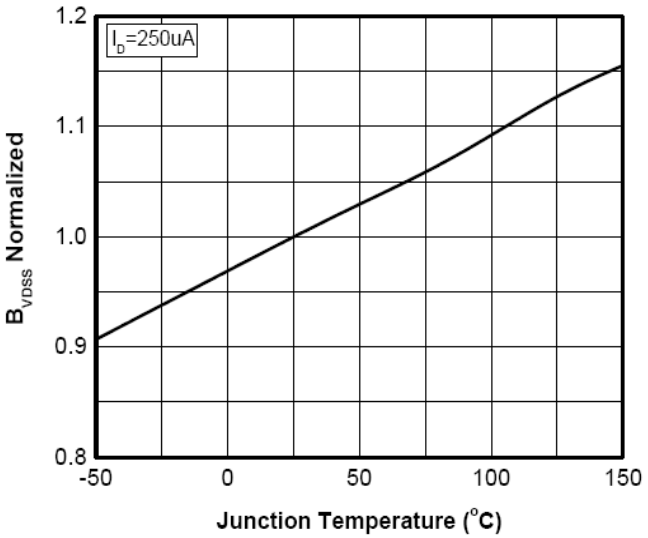


Figure 11: Typ. D-S breakdown voltage vs. Tj

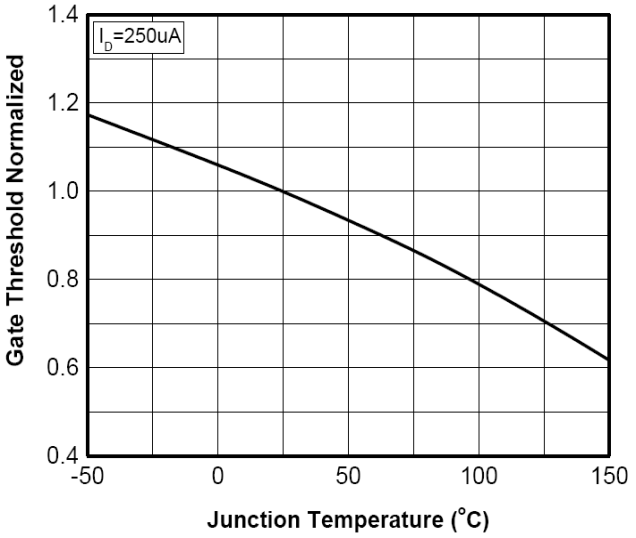


Figure 12: Typ. Threshold voltage vs. Tj

Typical Performance Characteristics

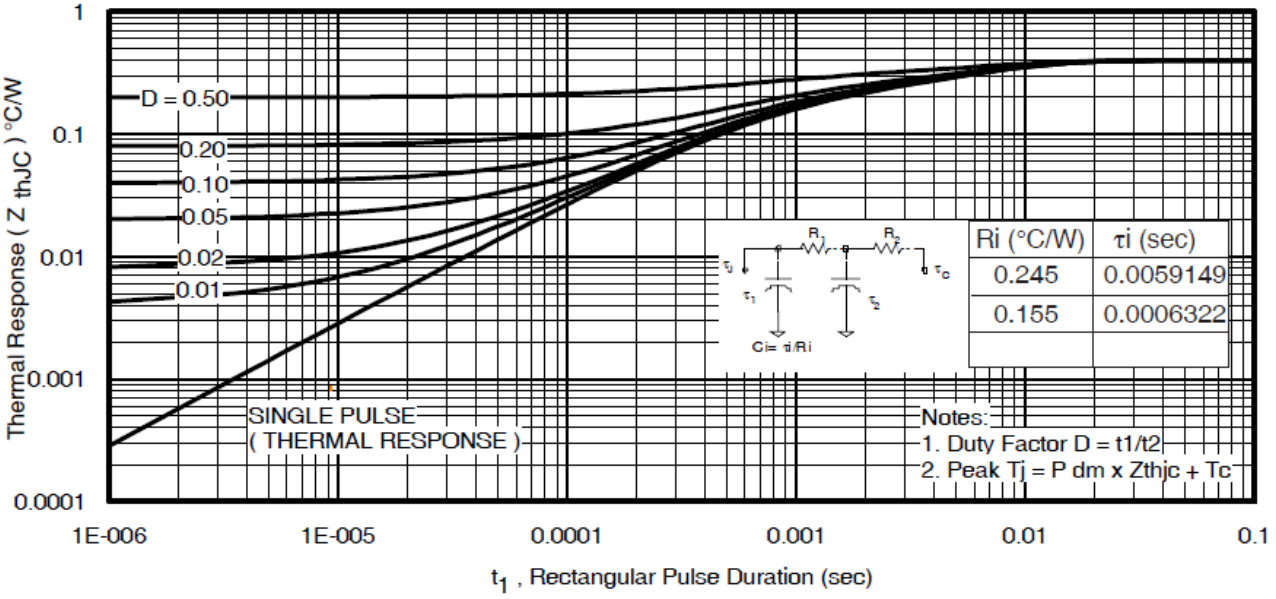
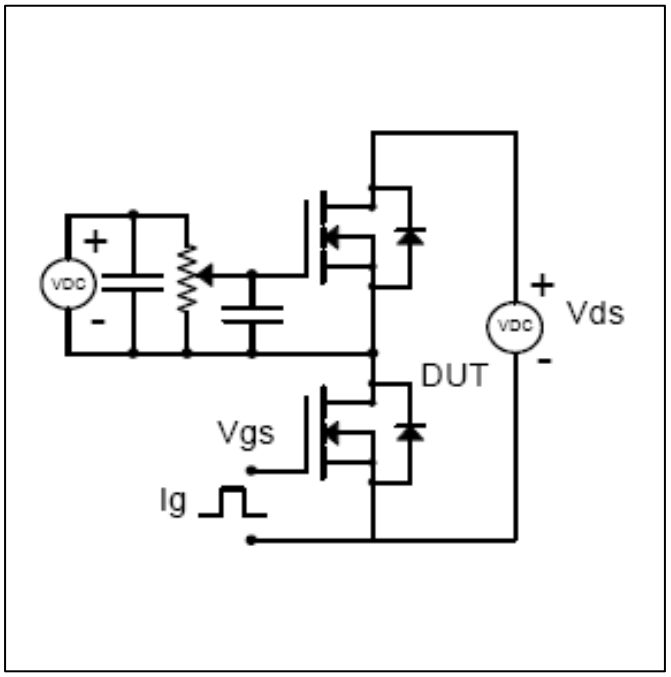
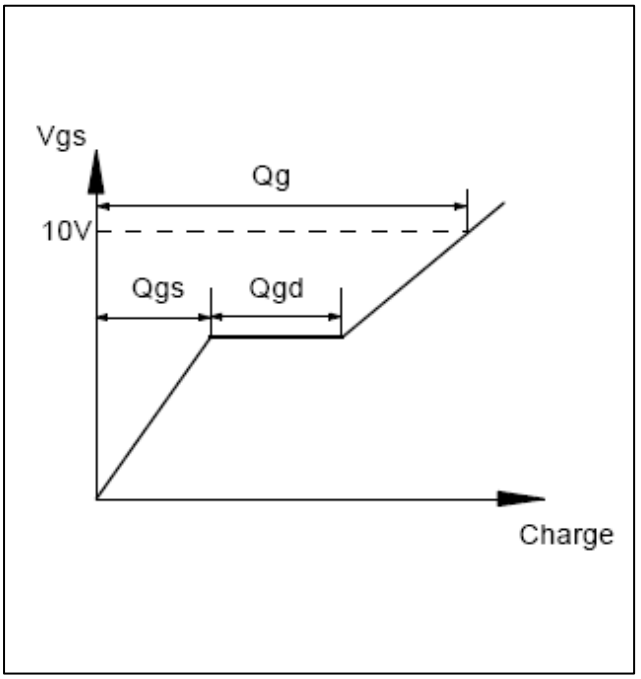


Figure 14: Max. transient thermal impedance, Junction-to-Case

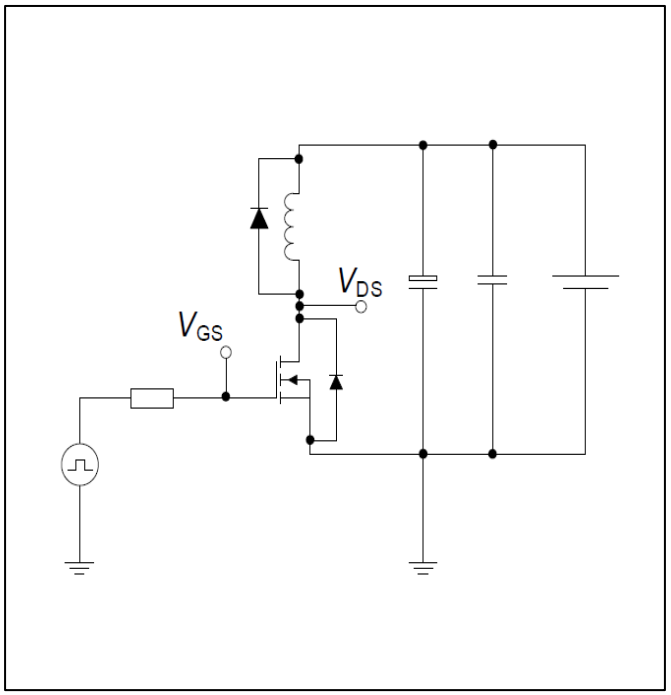
Test circuits

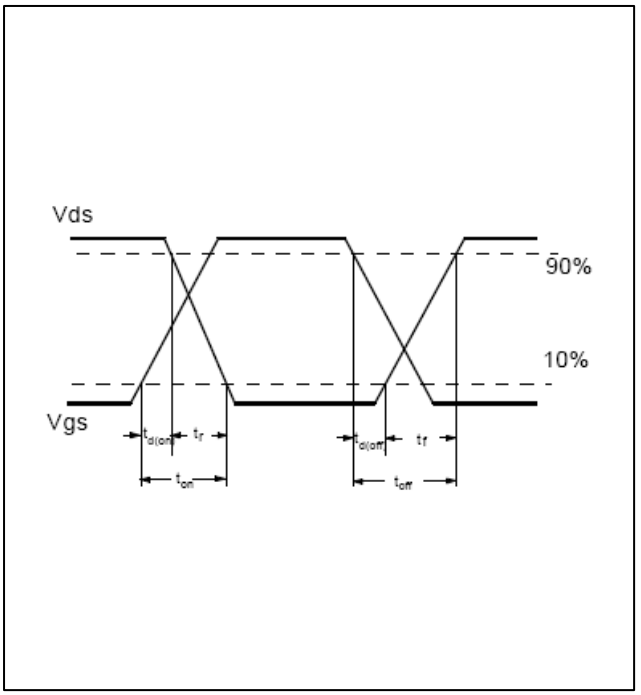
Gate Charge Test Circuit and Waveform





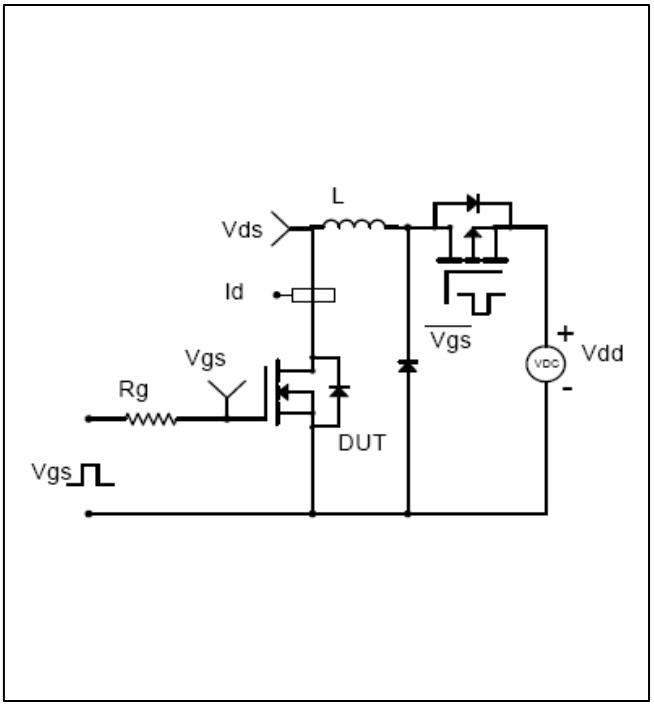
Inductive Switching Test Circuit and Waveforms

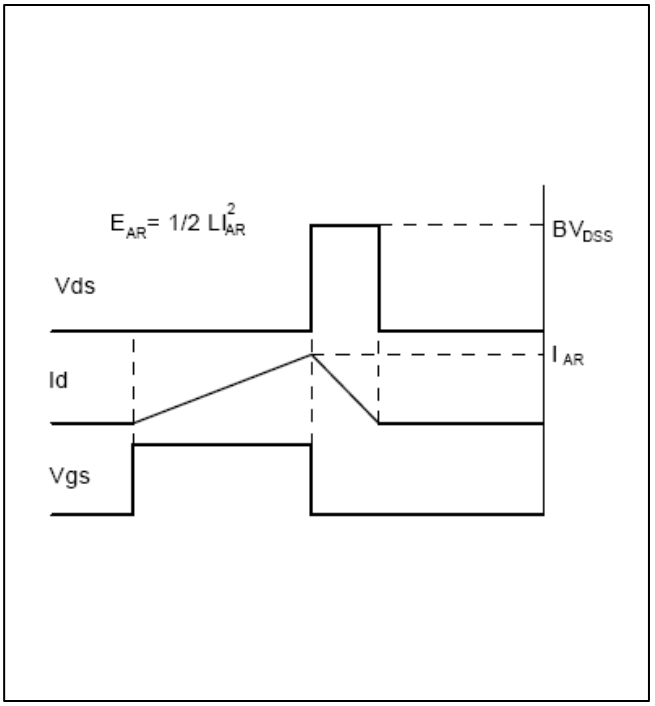




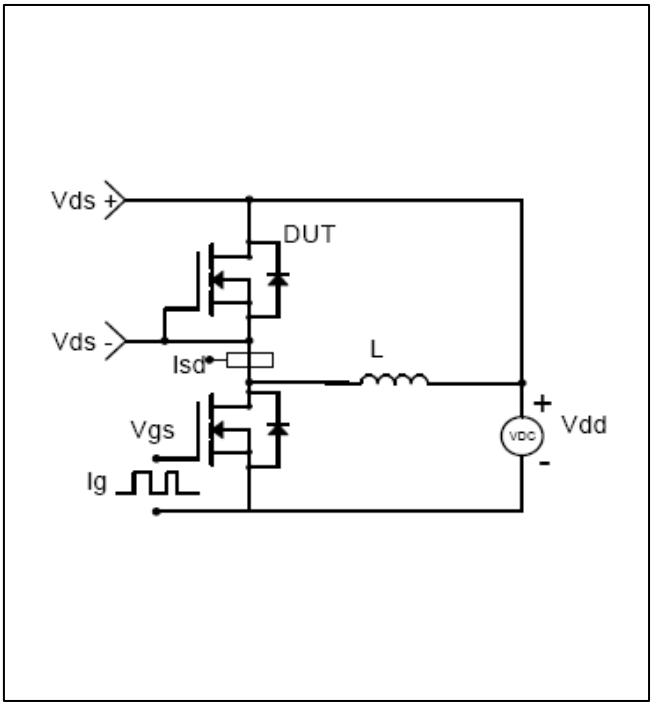
Test circuits

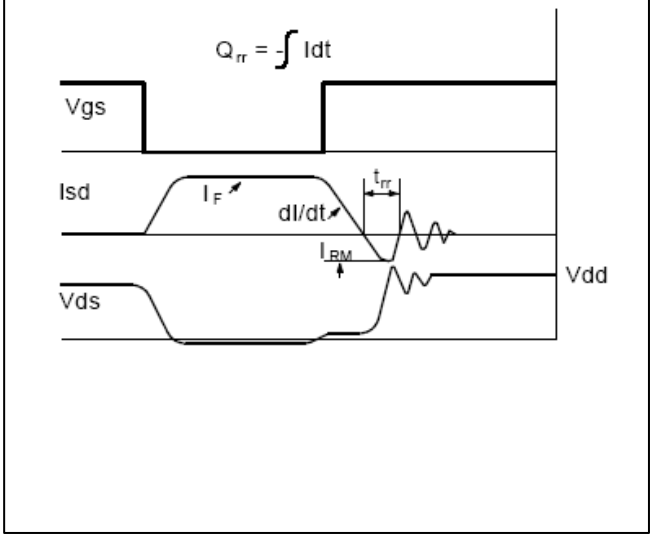
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





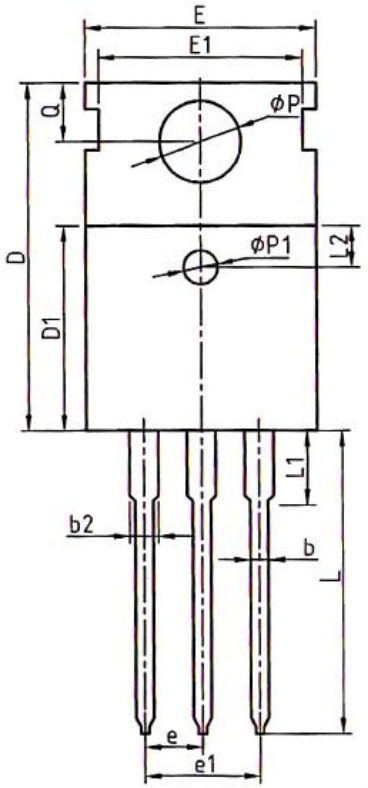
Diode Recovery Test Circuit & Waveforms

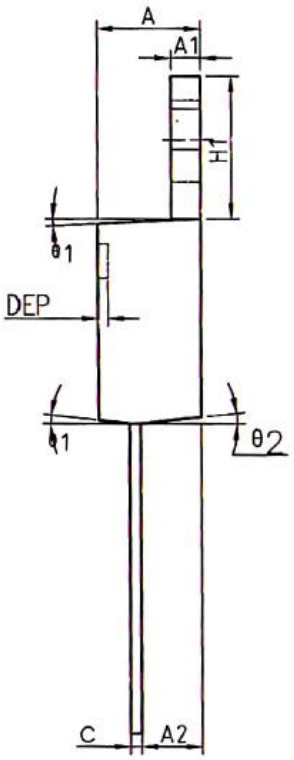


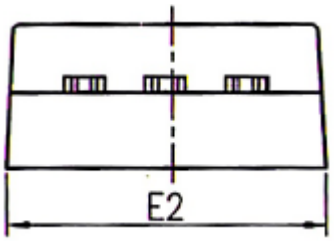


Package Outline

TO-220







COMMON DIMENIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.40	4.57	4.70
A1	1.27	1.30	1.37
A2	2.35	2.40	2.50
b	0.77	0.80	0.90
b2	1.17	1.27	1.36
c	0.48	0.50	0.56
D	15.40	15.60	15.80
D1	9.00	9.10	9.20
DEP	0.05	0.10	0.20
E	9.80	10.00	10.20
E1	–	8.70	–
E2	9.80	10.00	10.20
ΦP1	1.40	1.50	1.60
e		2.54BSC	
e1		5.08BSC	
H1	6.40	6.50	6.60
L	12.75	13.50	13.65
L1	–	3.10	3.30
L2		2.50REF	
ΦP	3.50	3.60	3.63
Q	2.73	2.80	2.87
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	1°	3°	5°

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