Leiditech

LMAK4N65

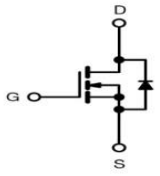
N-Channel Enhancement Mode Power MOSFET

PRODUCT SUMMARY	
I_D	4A
V_{DS}	650V
$R_{DS(ON)}$–max ($@V_{GS}$=10V)	2.4Ω
Q_g-typ. (nC)	14.7
Configuration	single

Features

- Low Gate Charge
- Low ON Resistance
- Improved dv/dt Capability
- 100% Avalanche Tested
- RoHS compliant

TO-252



Schematic diagram

Applications

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- AC to DC Converters
- LED Lighting
- Adapter

ORDERING INFORMATION				
Item	Sales Type	Marking	Package	Packaging
1	LMAk4N65		TO-252	REEL

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise noted)

Parameter	Symbol	Limit		Unit
		TO-252		
Drain to Source Voltage	V_{DS}	650		V
Continuous Drain Current ($@T_C$=25°C)	I_D	4 (1)		A
Continuous Drain Current ($@T_C$=100°C)		2.5 1)		A
Drain current pulsed (2)	I_{DM}	16 (1)		A
Gate to Source Voltage	V_{GS}	±30		V
Single pulsed Avalanche Energy (3)	E_{AS}	96		mJ
Peak diode Recovery dv/dt (4)	dv/dt	5		V/ns
Total power dissipation ($@T_C$=25°C)	P_D	20	166	W
Derating Factor above 25°C		0.16	1.3	W/°C
Operating Junction Temperature & Storage Temperature	T_{STG}, T_J	-55 to + 150		°C
Maximum lead temperature for soldering purpose	T_L	260		°C

Notes

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. L = 12mH, I_{AS} = 4A, V_{DD} = 50V, R_G=25Ω, Starting at T_J = 25°C
4. I_{SD} ≤ I_D, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Starting at T_J =25°C

THERMAL CHARACTERISTICS			
Parameter	Symbol	Value	Unit
		TO-252	
Thermal resistance, Junction to case (Maximum)	R_{thjc}	0.75	°C/W
Thermal resistance, Junction to ambient (Maximum)	R_{thja}	110	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain to source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	650	--	--	V
Breakdown voltage temperature coefficient	ΔBV_{DSS} / ΔTJ	I_D=250uA, referenced to 25°C	--	0.65	--	V/°C
Drain to source leakage current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	--	--	1	uA
		V_{DS}=520V, T_C=125°C	--	--	50	uA
Gate to source leakage current, forward	I_{GSS}	V_{GS}=30V, V_{DS}=0V	--	--	100	nA
Gate to source leakage current, reverse		V_{GS}=-30V, V_{DS}=0V	--	--	-100	nA
On Characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	2.5	3.5	4.5	V
Drain to source on state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A	--	2	2.4	Ω
Forward Transconductance	Gfs	V_{DS}=30V, I_D=2A	--	4.3	--	S
Dynamic Characteristics						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	--	627	--	pF
Output capacitance	C_{oss}		--	55	--	
Reverse transfer capacitance	C_{rss}		--	4.5	--	
Turn on delay time	$t_{d(on)}$	V_{DS}=320V, I_D=4A , R_G=25Ω , V_{GS}=10V	--	14	--	ns
Rising time	tr		--	15	--	
Turn off delay time	$t_{d(off)}$		--	48	--	
Fall time	t_f		--	18	--	
Total gate charge	Q_g	V_{DS}=520V, V_{GS}=10V, I_D=4A	--	14.7	--	nC
Gate-source charge	Q_{gs}		--	2.8	--	
Gate-drain charge	Q_{gd}		--	5.7	--	
Gate Resistance	Rg	V_{DS}=0V, Scan F mode	--	2.9	--	Ω

SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous source current	I_S	Integral reverse p-n Junction diode in the MOSFET	--	--	4	A
Pulsed source current	I_{SM}		--	--	16	A
Diode forward voltage drop.	V_{SD}	I_S=4A, V_{GS}=0V	--	--	1.3	V
Reverse recovery time	T_{rr}	I_S=4A, V_{GS}=0V, dI_F/dt=100A/us	--	345	--	ns
Reverse recovery Charge	Qrr		--	1.8	--	uC
Peak Reverse Recovery Current	Irrm	I_S=4A, dI_F/dt=100A/us	--	10.7	--	A

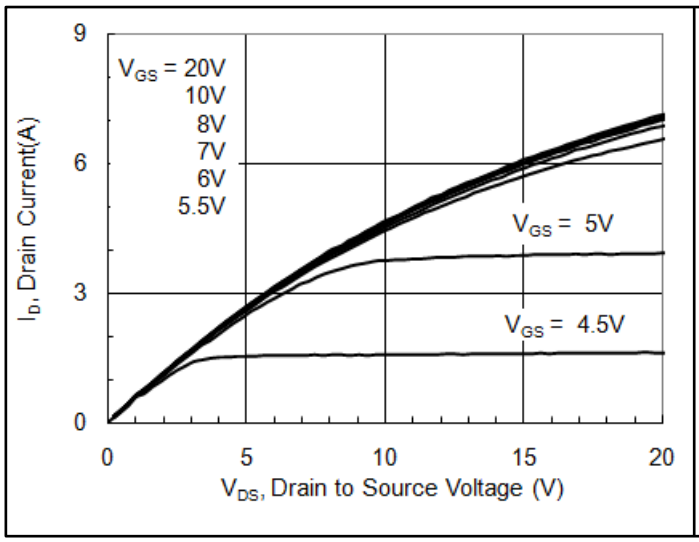


Fig1. Output characteristics

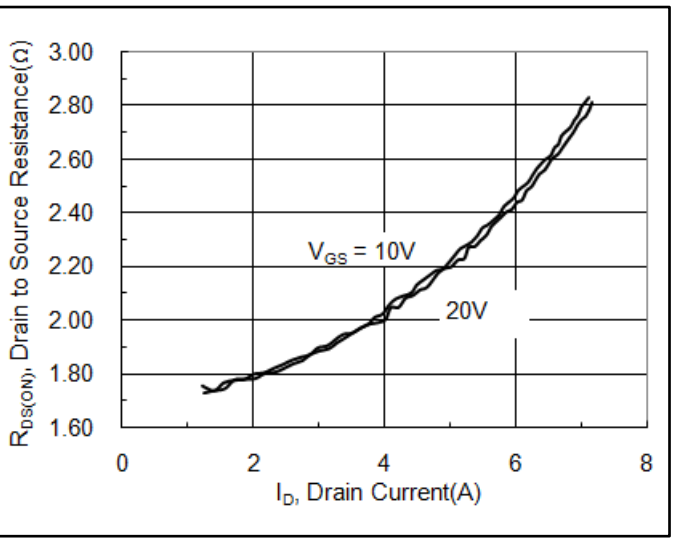


Fig2. Drain-source on-state resistance

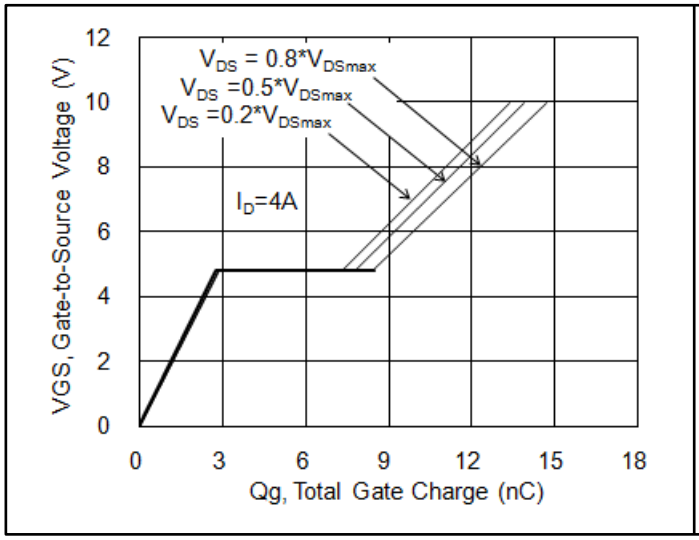


Fig3. Gate charge characteristics

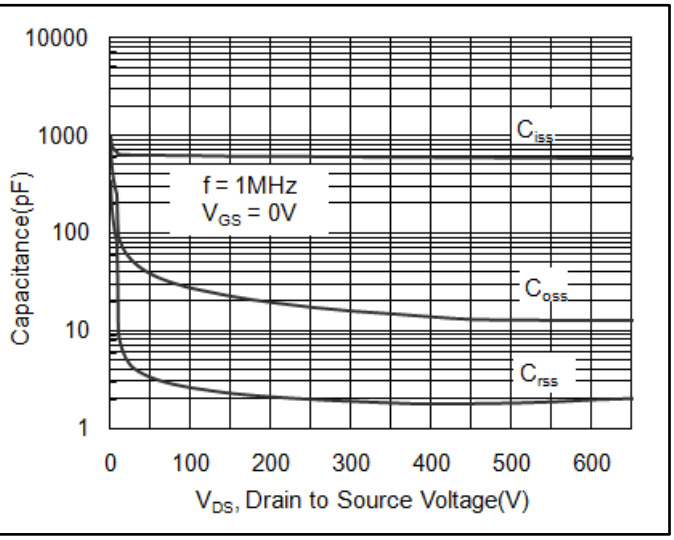
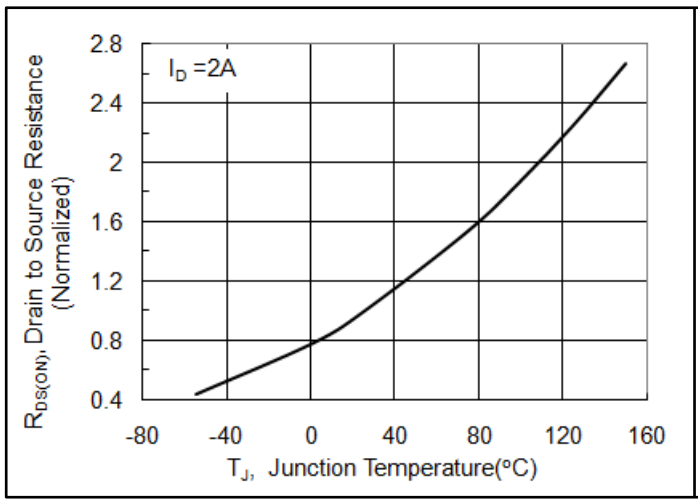


Fig 4. Capacitance Characteristics



$_{DS}$ vs

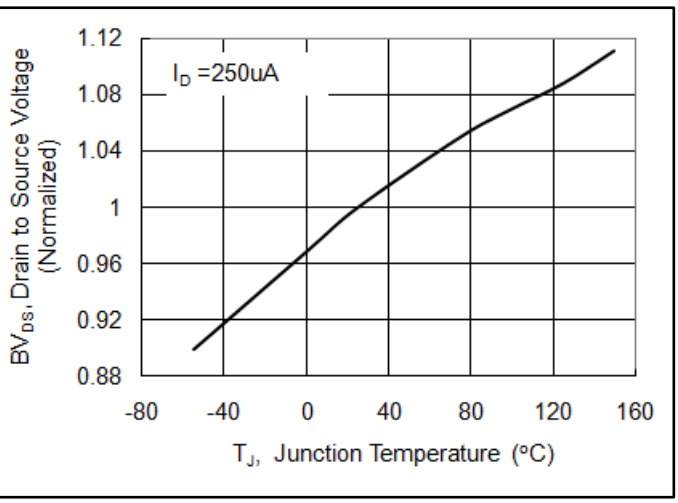


Fig 6. BV_{DSS} vs junction temperature

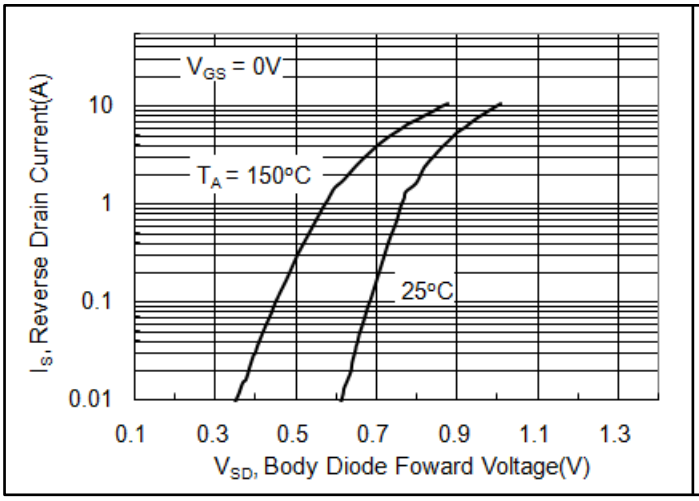


Fig 7. Forward characteristics of reverse diode

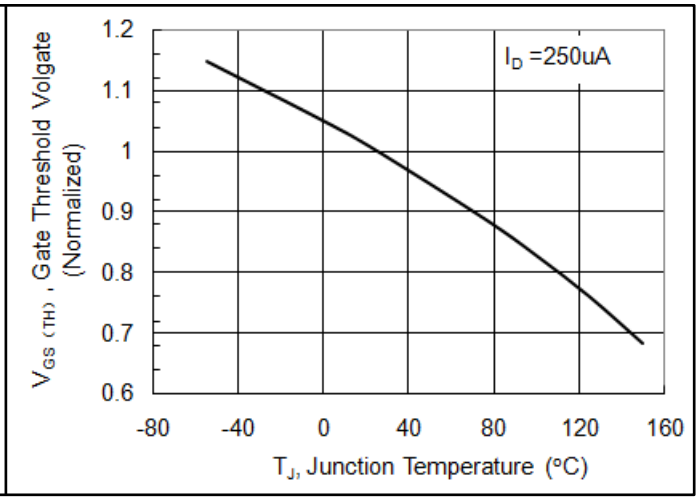


Fig 8. $V_{GS\ (TH)}$ vs junction temperature

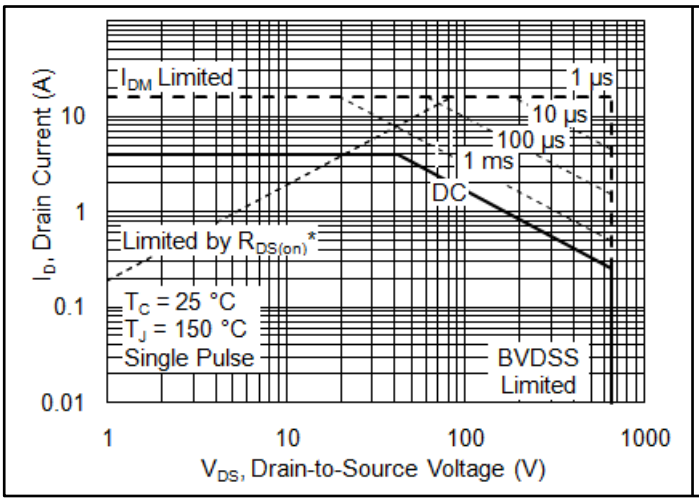


Fig9. Safe operating area (&TO-252)

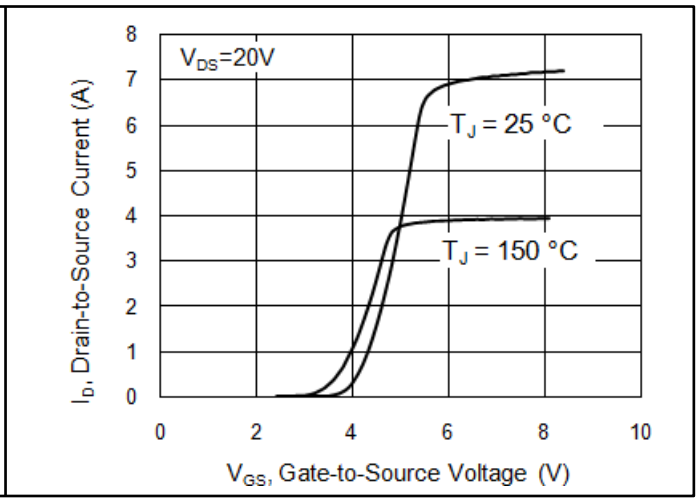


Fig 10. Transfer characteristics

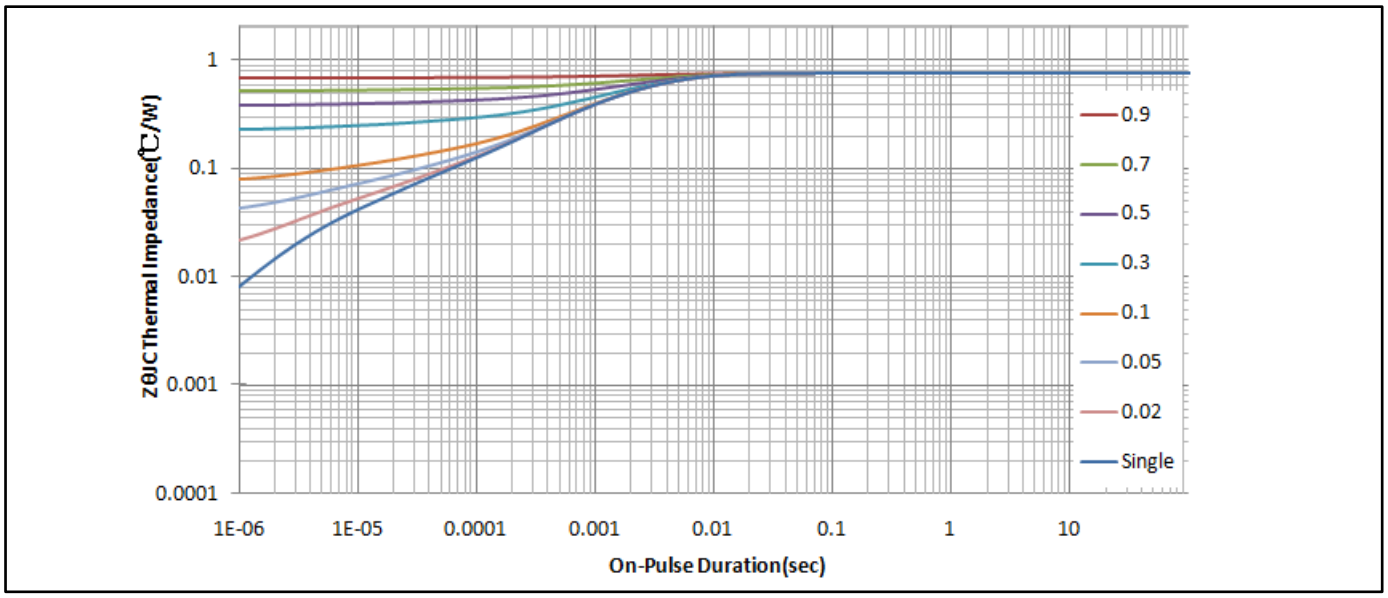


Fig 11 . Transient thermal impedance(&TO-252)

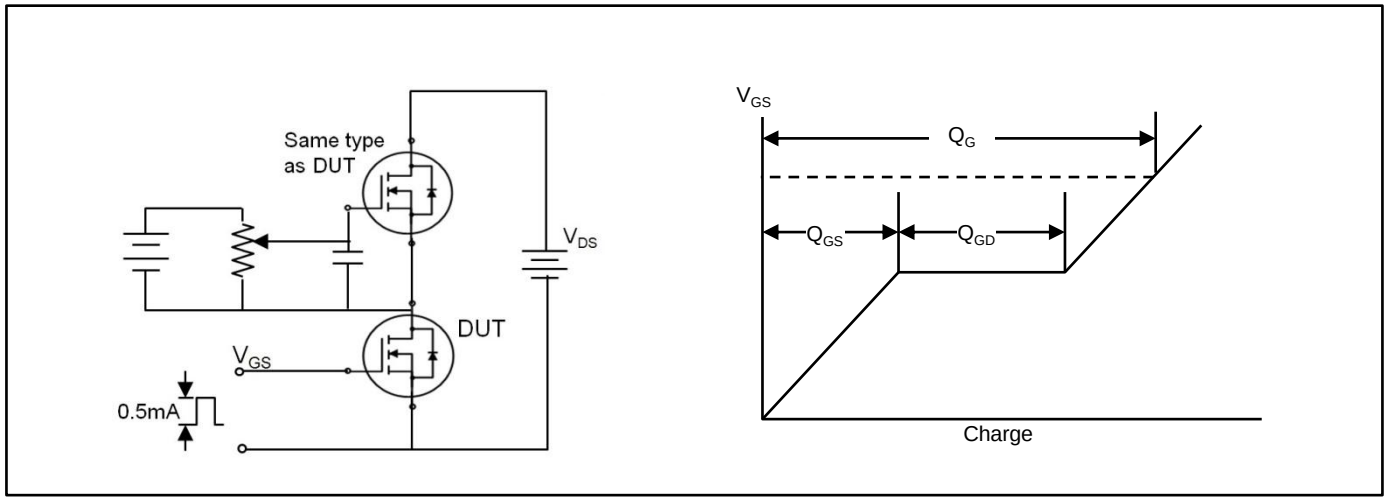


Fig 12. Gate charge test circuit & waveform

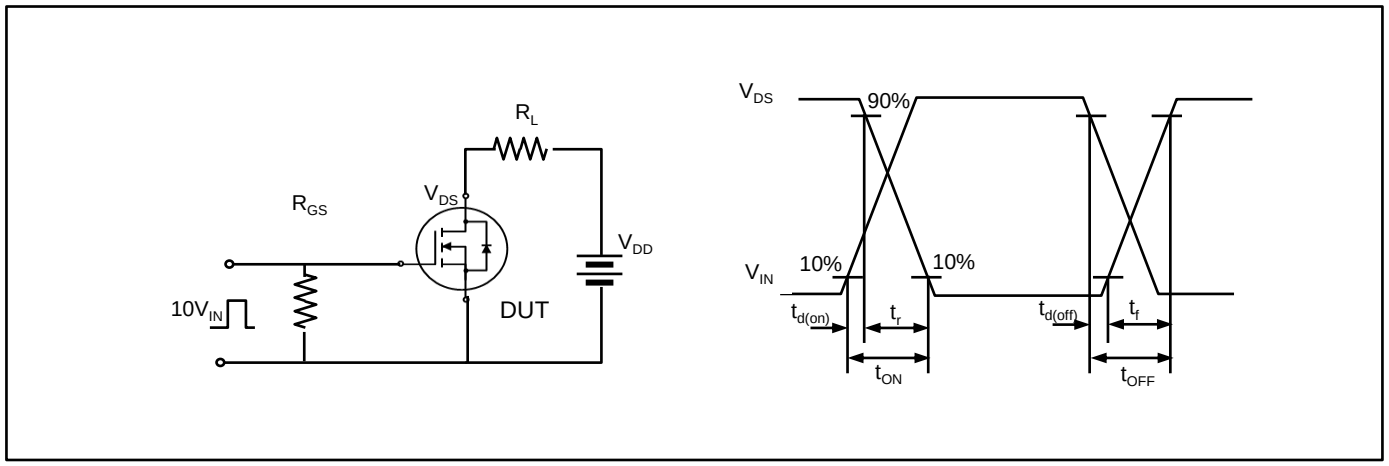


Fig 13. Switching time test circuit & waveform

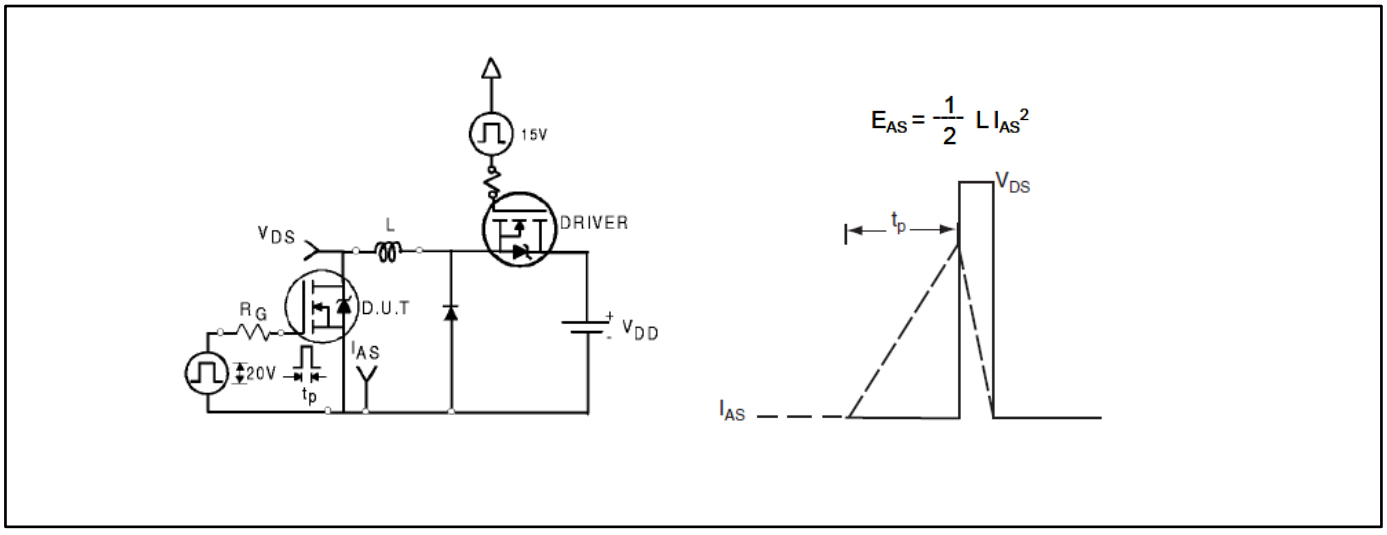


Fig 14. Unclamped Inductive switching test circuit & waveform

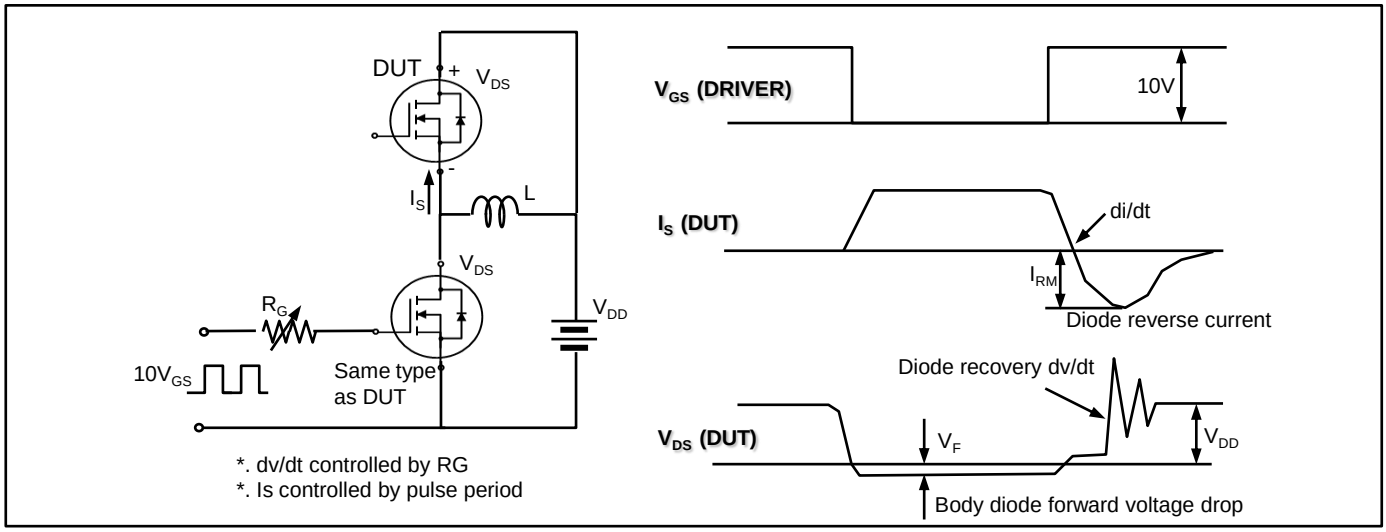
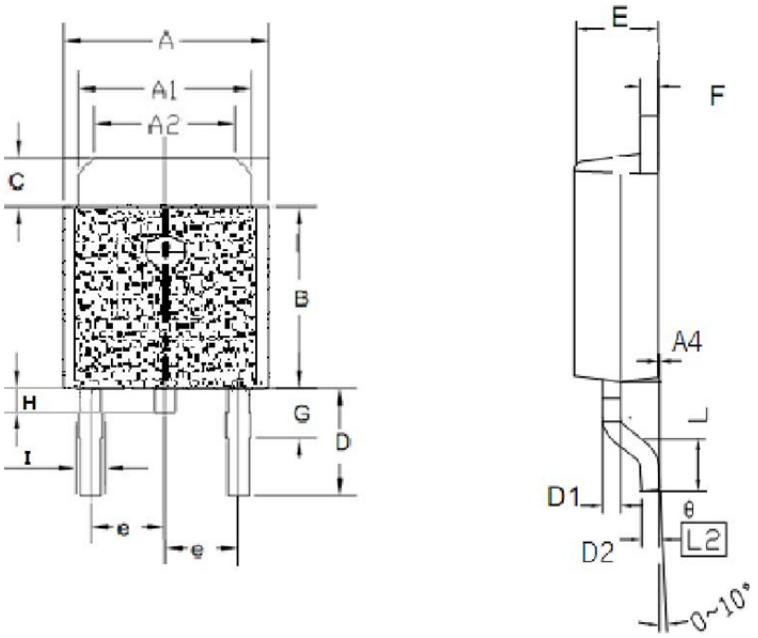


Fig 15. Peak diode recovery dv/dt test circuit & waveform

TO-252



Symbol	Min	Max	Symbol	Min	Max
A	6.40	6.60	**D**	2.90	3.10
A1	5.20	5.40	**D1**	0.45	0.55
A2	4.40	4.60	**D2**	0.45	0.55
A3	4.40	4.60	**e**	2.30	
A4	0.00	0.15	**E**	2.20	2.40
A5	4.65	4.95	**F**	0.49	0.59
B	6.00	6.20	**G**	1.70	
B1	1.57	1.77	**L**	1.40	1.60
C	0.90	0.96	**θ(度)**	0.00	10.00
I	0.60	0.90	**H**	0.49	0.52

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