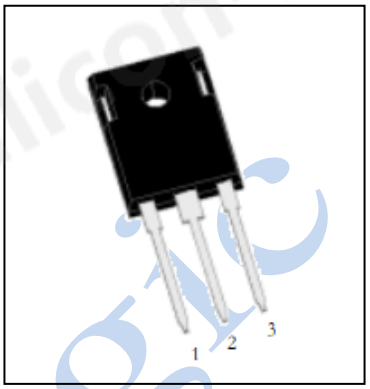
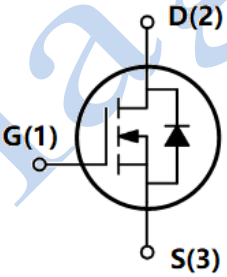
N-Channel 650V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
650	65@ V_{GS} = 10V	47(1)

TO247-3L





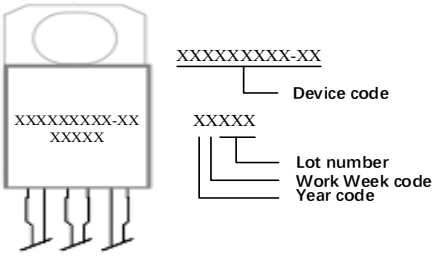
Pb-free
RoHS
COMPLIANT
HALOGEN
FREE

Features

- Low $R_{DS(on)}$ and FOM
- Low Switching loss
- 100% avalanche tested. High avalanche ruggedness
- Robust body diode

Applications

- Telecom / Server Power Supplies
- Industrial Power Supplies
- EV Charger
- UPS / Solar



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Package and ordering information

Ordering code	Package	Device code
SJH65N065WH-AA	TO247-3L	H65N065WH-AA

1. Maximum ratings

Absolute maximum ratings (T_A = 25℃ unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-source voltage		V_{DS}	650	V
Gate-source voltage		V_{GS}	±30	V
Continuous drain current(1)	T_C=25℃(1)	I_D	47	A
	T_C=100℃ (1)		30	
Pulsed drain current(2)		$I_{D,pulse}$	188	
Avalanche energy, single pulse(3)		E_{AS}	810	mJ
Power dissipation	T_C=25℃	P_D	357	W
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 150	℃

2. Thermal resistance ratings

Thermal resistance ratings				
Parameter[4]		**Symbol**	**Max.**	**Unit**
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	0.35	°C/W
Thermal resistance, junction-to-ambient	Steady state	$R_{\theta JA}$	40	

3. Electrical characteristics

Electrical characteristics						
Parameter	**Symbol**	**Test conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static parameter						
Drain to source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA	650			V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1 mA	3	4	5	V
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±30 V			±100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V			1	μA
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 17 A		57	65	mΩ
Gate resistance	R_g	f = 1 MHz, open drain		1		Ω
Dynamic[4]						
Total gate charge	Q_g	V_{DS} = 400 V, I_D = 17A, V_{GS} = 10 V		50		nC
Gate-source charge	Q_{gs}			19.4		
Gate-drain charge	Q_{gd}			9.8		
Turn-on delay time	$t_{d(on)}$	V_{DS} = 400 V, I_D = 17 A, V_{GS} = 10 V, R_{GEN} = 9.1 Ω		50.7		ns
Rise time	t_r			14.8		
Turn-off delay time	$t_{d(off)}$			49.4		
Fall time	t_f			8.3		
Input capacitance	C_{iss}	V_{DS} = 400 V, V_{GS} = 0 V, f = 100 KHz		3700		pF
Output capacitance	C_{oss}			82		
Reverse transfer capacitance	C_{rss}			5		
Energy related output capacitance	$C_{oss(er.)}$	V_{DS} = 0 V to 400 V, V_{GS} = 0 V		128.3		
Reverse Diode Characteristics[4]						
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_F = 17 A		0.82	1.1	V
Reverse recovery time	t_{rr}	V_{DS} = 100 V,I_F = 17 A, di/dt = 100 A/μs		351		ns
Reverse recovery charge	Q_{rr}			6		uC

Notes

(1) Limited by maximum junction temperature.

(2) Pulse width limited by maximum junction temperature.

(3) V_{DS} = 100 V, V_{GS} = 10 V, L = 60 mH.

(4) Guaranteed by design, not subject to production testing.

4. Electrical characteristics diagrams

Fig.1 Typ. transfer characteristics

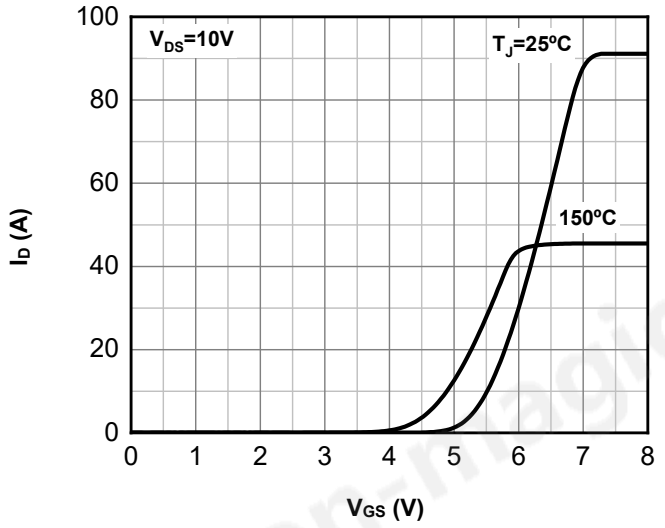


Fig.2 Typ. output characteristics at 25℃

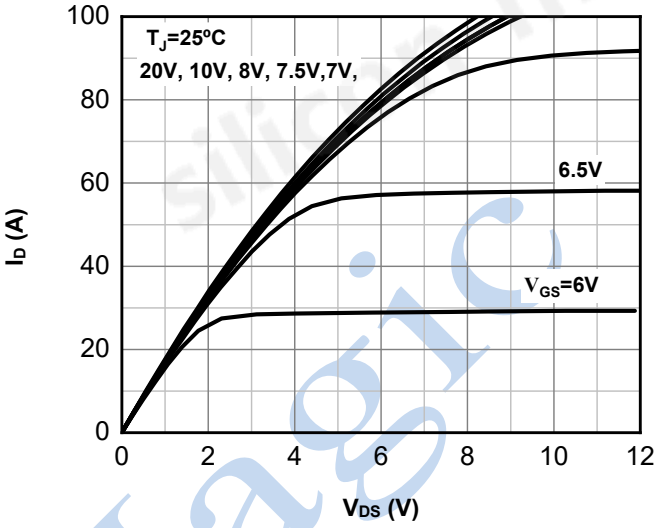


Fig.3 Normalized on-resistance vs junction temperature

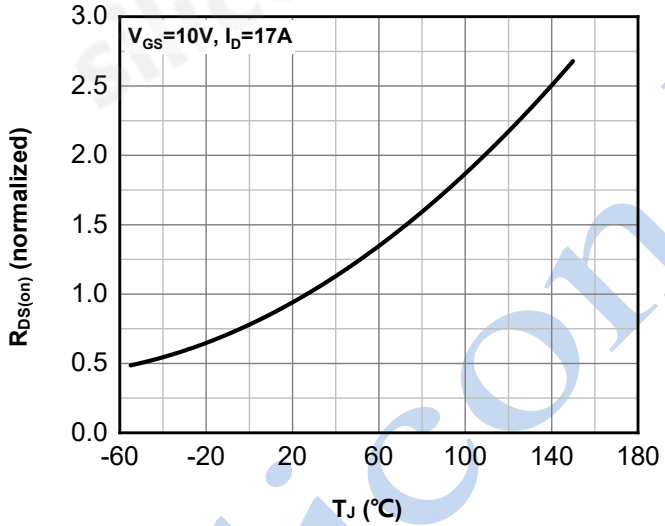


Fig.4 Normalized on-resistance vs drain current

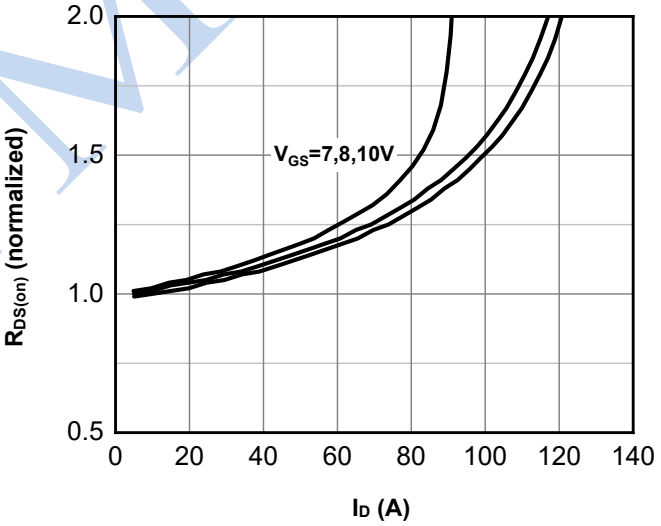


Fig.5 Typ. capacitance

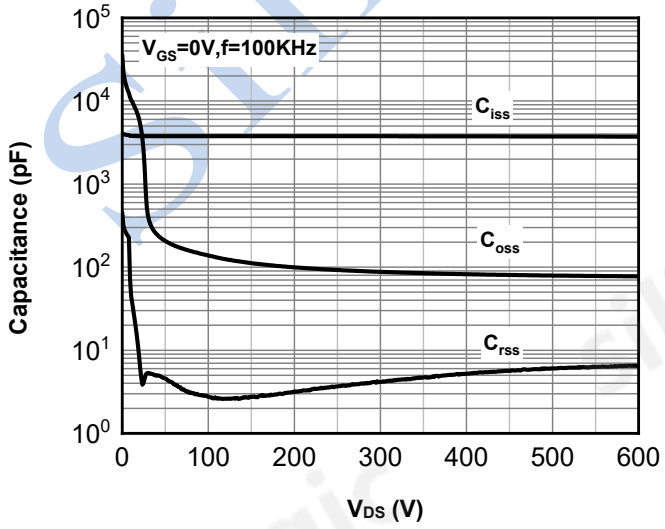


Fig.6 Typ. gate charge

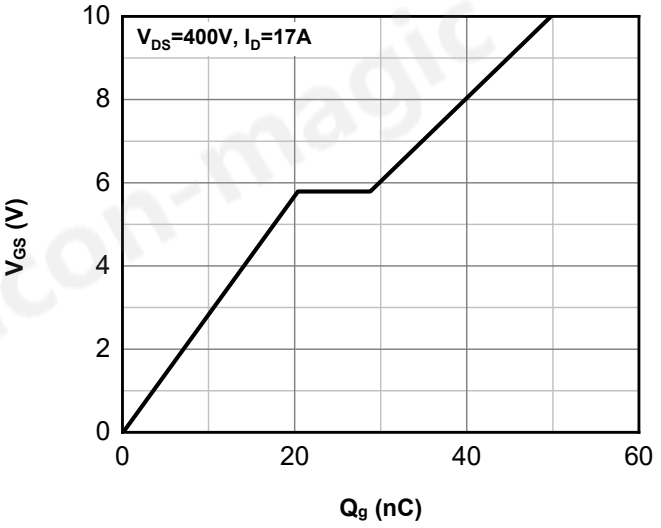


Fig.7 Typ. forward characteristics of body diode

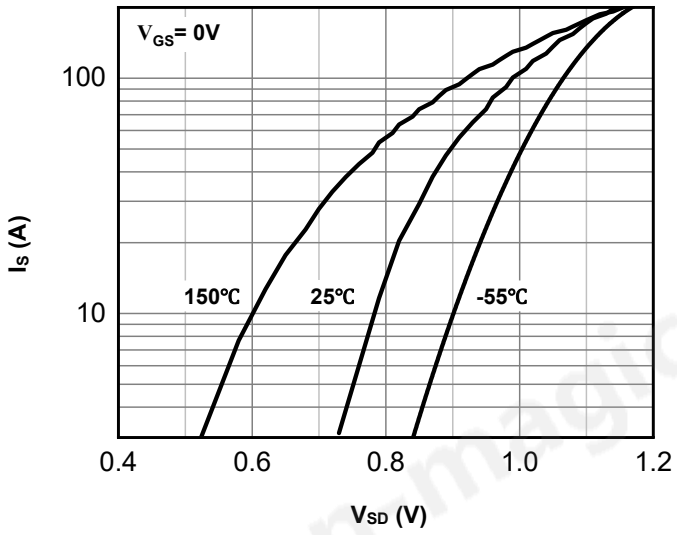


Fig.8 Safe operating area

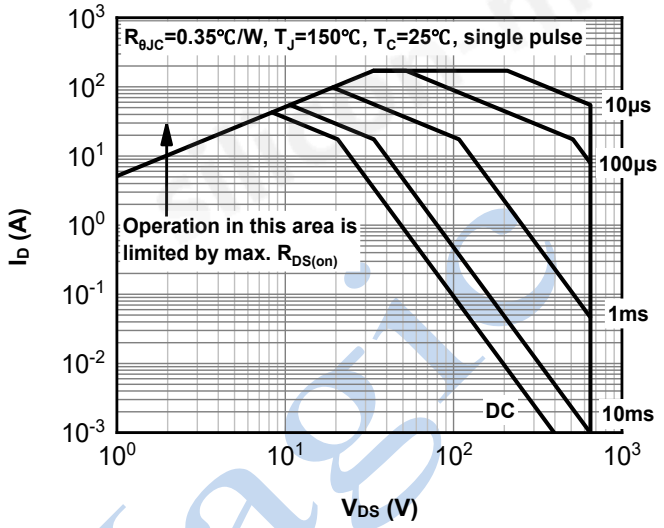


Fig.9 Drain current vs case temperature

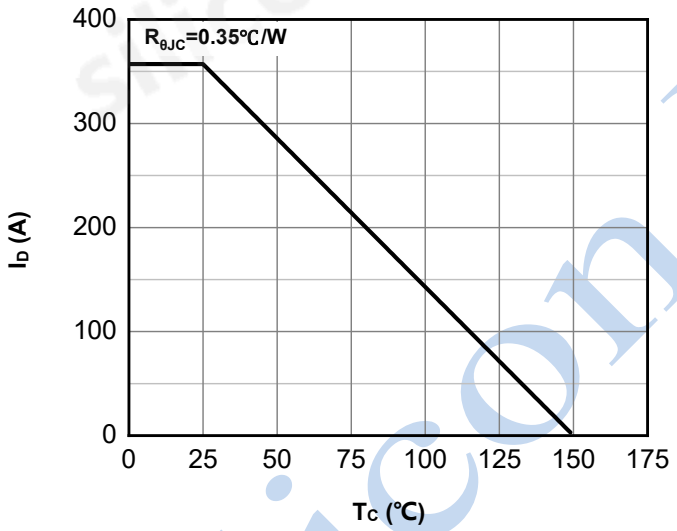


Fig.10 Typ. C_{oss} stored energy

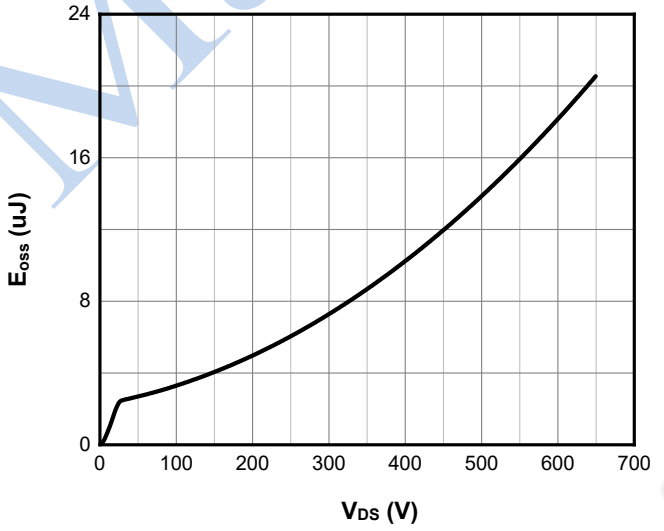


Fig.11 Normalized $V_{(BR)DSS}$ vs junction temperature

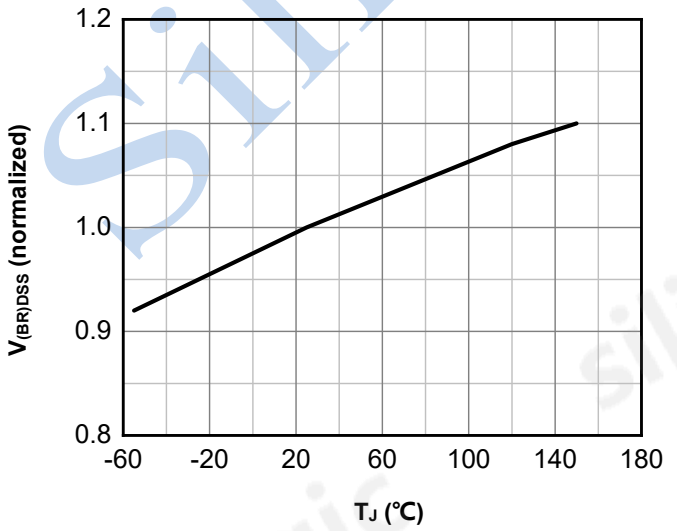


Fig.12 Normalized $V_{GS(th)}$ vs junction temperature

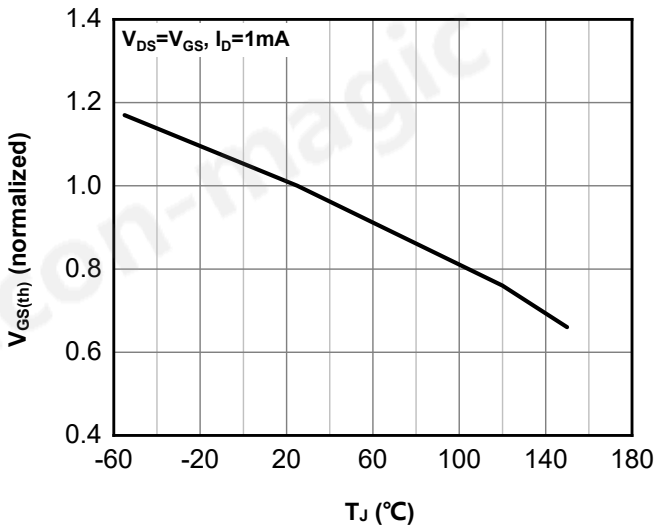
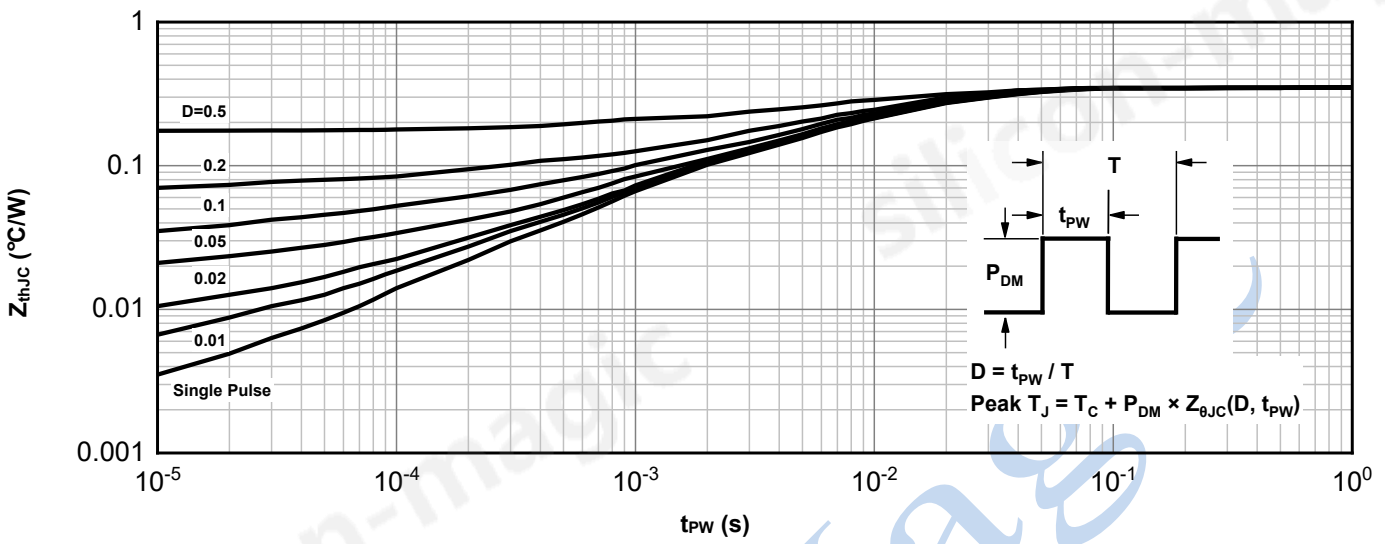


Fig.13 Transient thermal impedance from junction to case



5. Test circuits and waveforms

Figure 14. Gate charge test circuit & waveforms

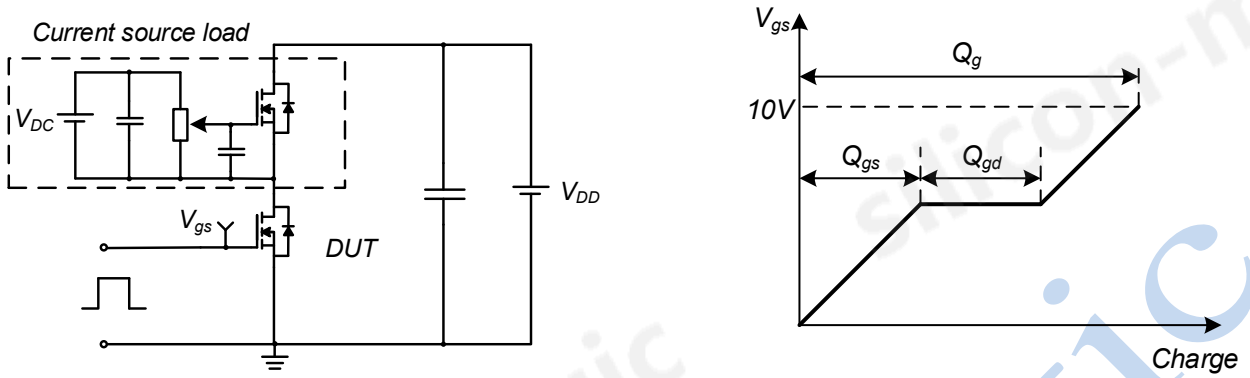


Figure 15. Switching time test circuit & waveforms

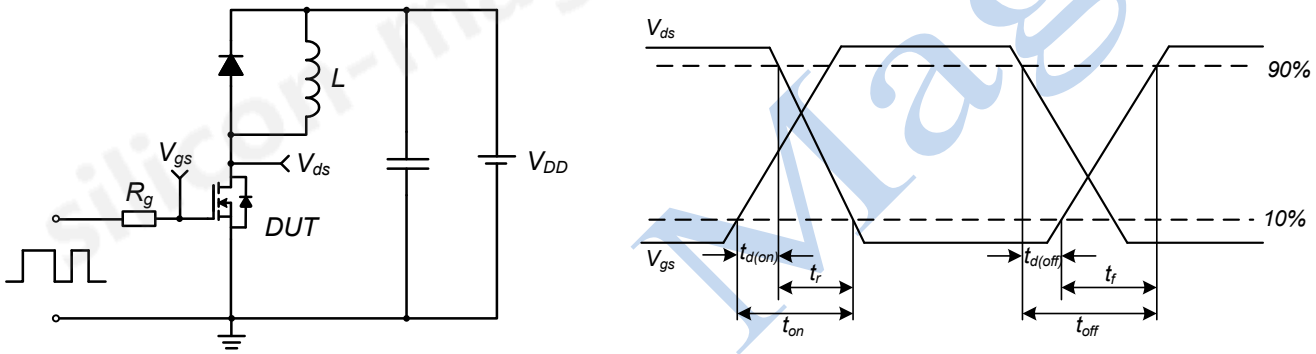


Figure 16. Diode reverse recovery test circuit & waveforms

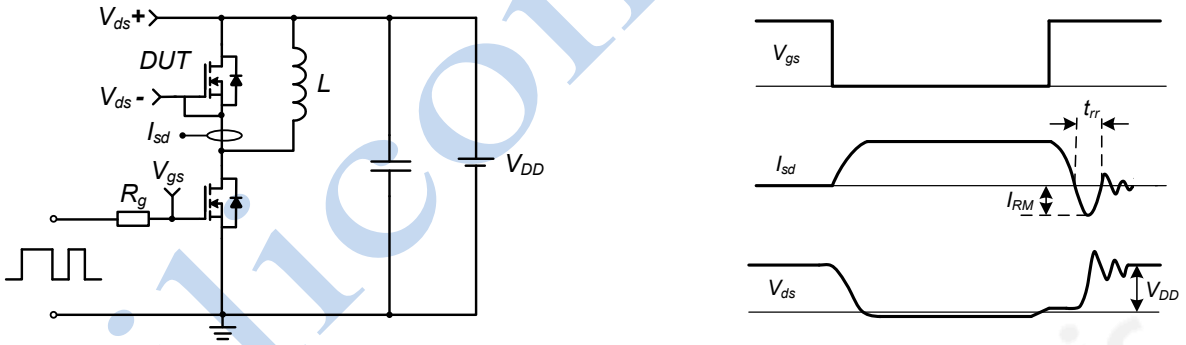
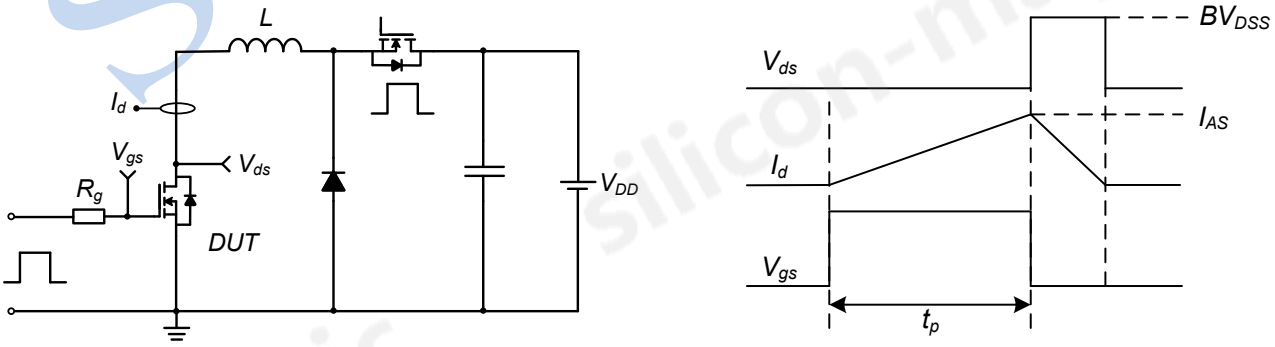
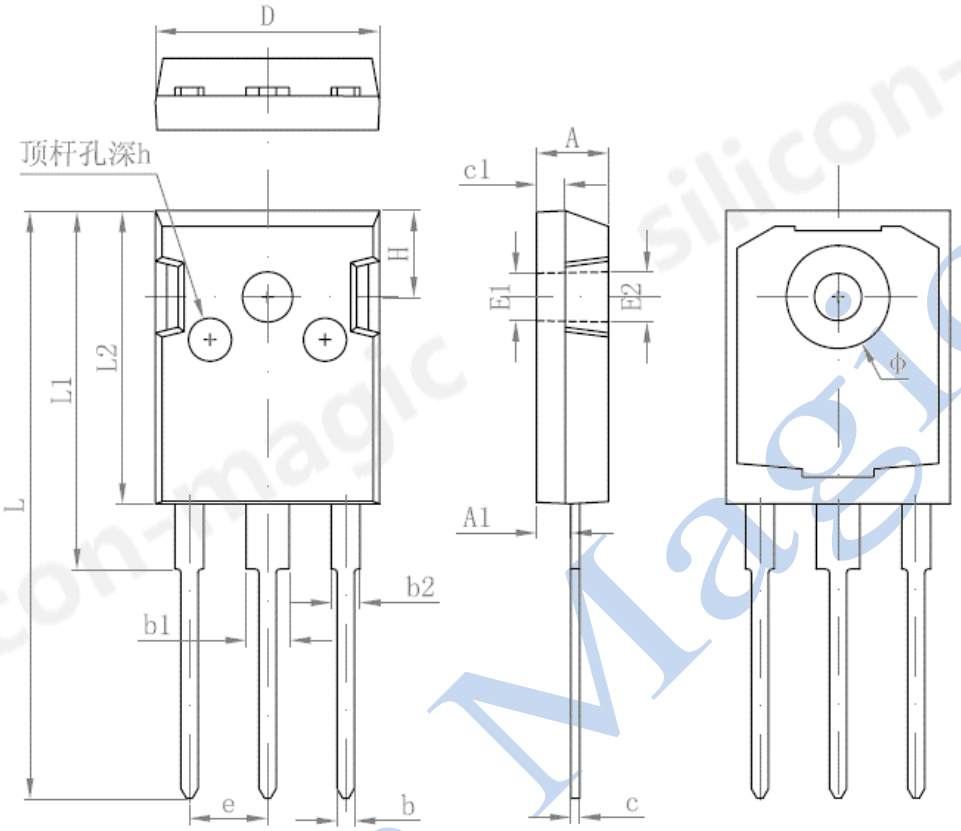


Figure 17. Unclamped inductive switching test circuit & waveforms



6. Package outline dimensions



Dim	Millimeters		
	Min	Nom	Max
A	4.850	-	5.150
A1	2.200	-	2.600
b	1.000	-	1.400
b1	2.800	-	3.200
b2	1.800	-	2.200
c	0.500	-	0.700
c1	1.900	-	2.100
D	15.450	-	15.750
E1	3.500 REF		
E2	3.600 REF		
L	40.900	-	41.300
L1	24.800	-	25.100
L2	20.300	-	20.600
Φ	7.100	-	7.300
e	5.450 TYP		
H	5.980 REF		
h	0.000	-	0.300

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