

650V Super-Junction MOSFET

●General Description

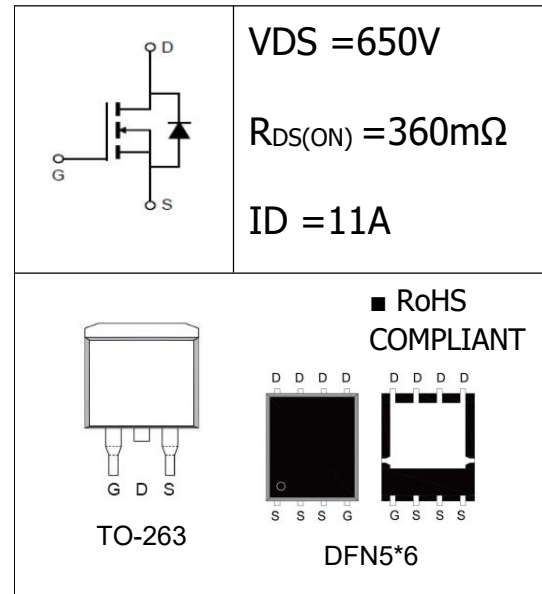
The SJ MOSFET HMS11N70 has the low $R_{DS(on)}$, low gate charge, fast switching and excellent avalanche characteristics. This device offers extremely fast and robust body diode, and is suitable for telecom and power supplies.

●Features

- Much lower $R_{on} \cdot A$ performance for On-state efficiency
- Much lower FOM for fast switching efficiency

●Application

- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Power Supplies



●Ordering Information:

Part number	HMS11N70D	HMS11N70Q
Package	TO-263	DFN5*6
Basic ordering unit (pcs)	800	5000
Normal Package Material Ordering Code	HMS11N70D XXXX	HMS11N70Q XXXX
Halogen Free Ordering Code	HMS11N70D XXXX	HMS11N70Q XXXX

●Absolute Maximum Ratings (TC = 25°C)

PARAMETER		SYMBOL	Value	UNIT
Drain-Source Breakdown Voltage		BV_{DSS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	TC = 25°C	I_D	11	A
	TC = 100°C		6.6	
Pulsed drain current (TC = 25°C, tp limited by Tjmax) ¹		I_D pulse	33	A
Single Pulse Avalanche Energy		I_{AR}	1.8	A
Single Pulse Avalanche Energy ²		E_{AS}	215	mJ
Repetitive Avalanche Energy ²		E_{AR}	0.32	mJ
Power Dissipation (TC=25°C)		P_D	82	W
Operating Temperature and Storage Temperature Range		T_J/T_{STG}	-55~+150	°C
Reverse diode dv/dt ³		dv/dt	15	V/ns
Maximum diode commutation speed ³		di/dt	500	V/ns

●Electronic Characteristics

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	--	4.0	V
Drain-source On Resistance ³	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$	--	0.36	0.38	Ω
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ C$	--	--	1	μA
		$V_{DS}=650V, V_{GS}=0V, T_J=125^\circ C$	--	--	100	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30$	--	--	± 100	nA
Forward Transconductance ³	R_G	$f=1.0MHz$ open drain	--	--	18	Ω
Input Capacitance	C_{iss}	$V_{GS}=0V,$ $V_{DS}=100V$ $f=1.0MHz$	--	808	--	pF
Output Capacitance	C_{oss}		--	33	--	
Reverse transfer Capacitance	C_{rss}		--	2.0	--	
Turn -Off Delay Time	$T_d(off)$	$V_{DD}=400V,$ $I_D=11.0A$ $R_G=25\Omega$	--	145	--	ns
Turn-on delay time	$T_d(on)$		--	70	--	
Rise time	T_r		--	70	--	
Fall time	T_f		--	59	--	
Total Gate Charge	Q_g	$I_D=11A,$ $V_{DS}=520V$ $V_{GS}=10V$	--	22	---	nC
Gate-to-Source Charge	Q_{gs}		--	4	--	
Gate-to-Drain Charge	Q_{gd}		--	8	---	
Continuous Diode Forward Current	I_S		--	--	11	A
Pulsed Diode Forward Current ¹	I_{SM}		--	--	33	A
Diode Forward Voltage	V_{SD}	$T_J=25^\circ C, I_S=5.5A$ $V_{GS}=0V$	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	$V_{RR}=400V,$ $I_f=I_S$ $di_F/dt=100A/\mu s$	--	377	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.4	--	μC
Peak Reverse Recovery Current	I_{RRM}		--	17.8	--	A

●Thermal Characteristics

PARAMETER	SYMBOL	MAX	UNIT
Thermal Resistance Junction-case	R_{thJC}	1.51	$^\circ C/W$
Thermal Resistance Junction-ambient	R_{thJA}	62	$^\circ C/W$

Notes:

1.Repetitive Rating: Pulse width limited by maximum junction temperature.

2. $I_{AS}=1.8A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ C$

3. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

● **Typical Characteristics** $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

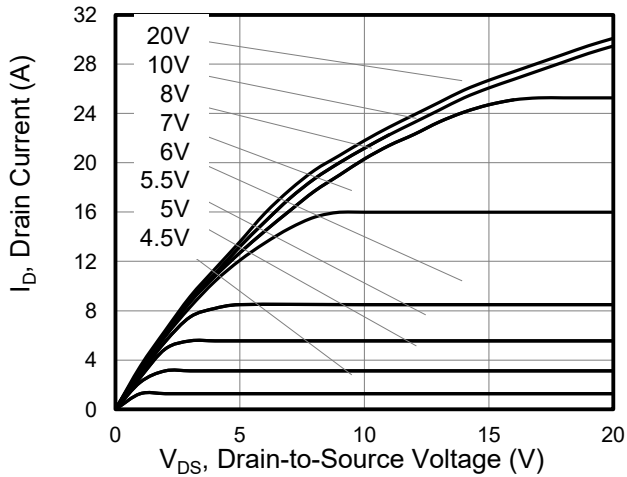


Figure 2. Transfer Characteristics

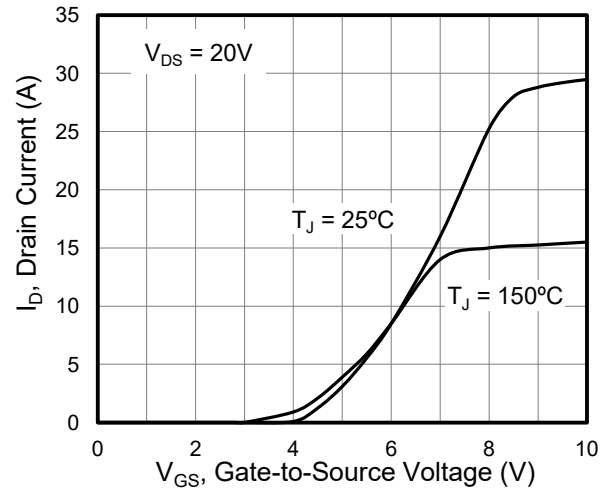


Figure 3. On-Resistance vs. Drain Current

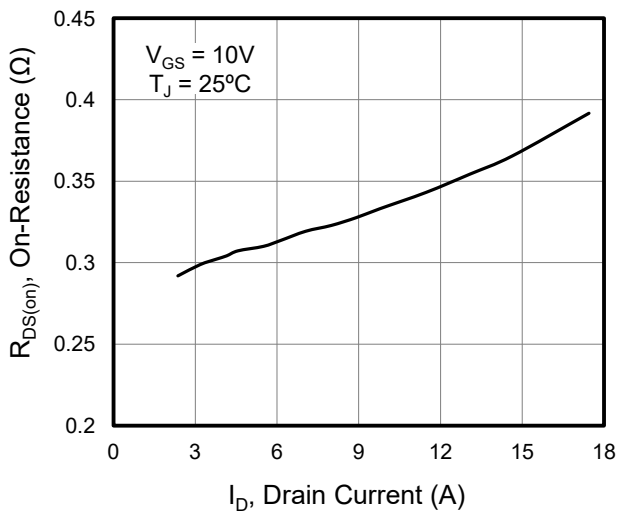


Figure 4. Capacitance

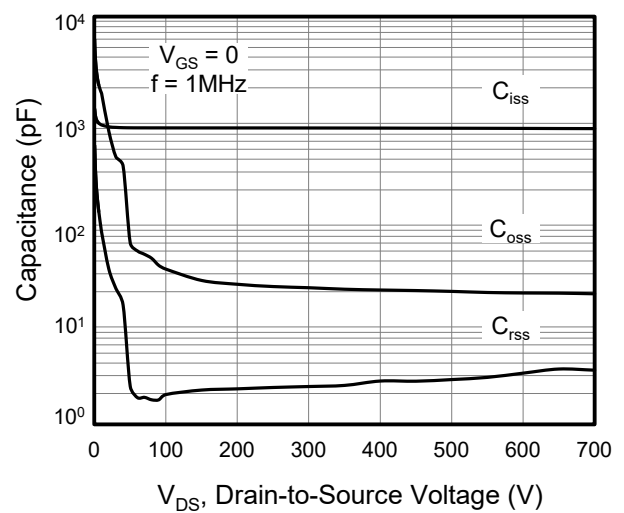


Figure 5. Gate Charge

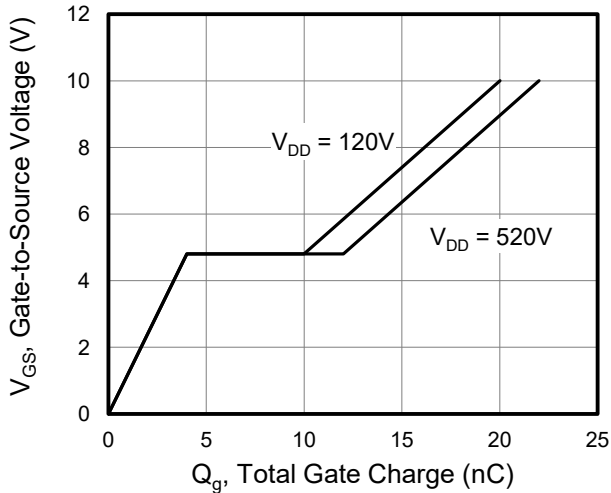
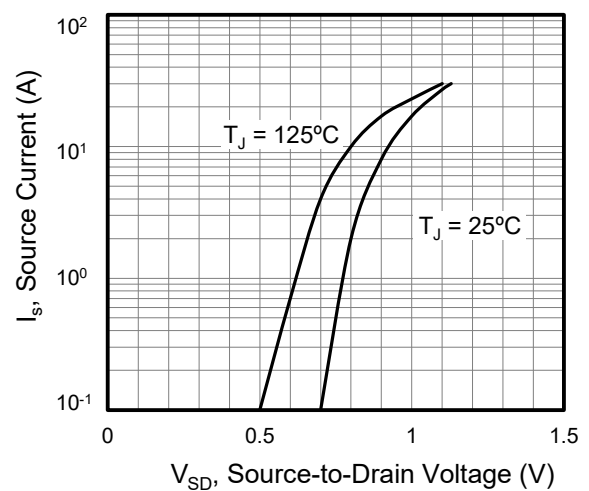


Figure 6. Body Diode Forward Voltage



●Typical Characteristics(Cont.)

Figure 7. On-Resistance vs. Junction Temperature

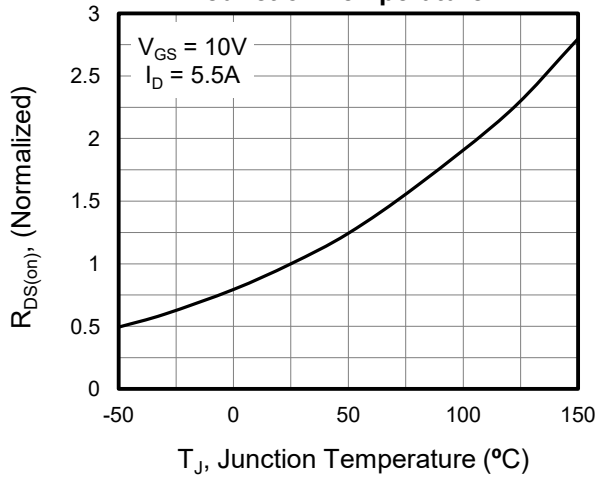


Figure 8. Breakdown voltage vs. Junction Temperature

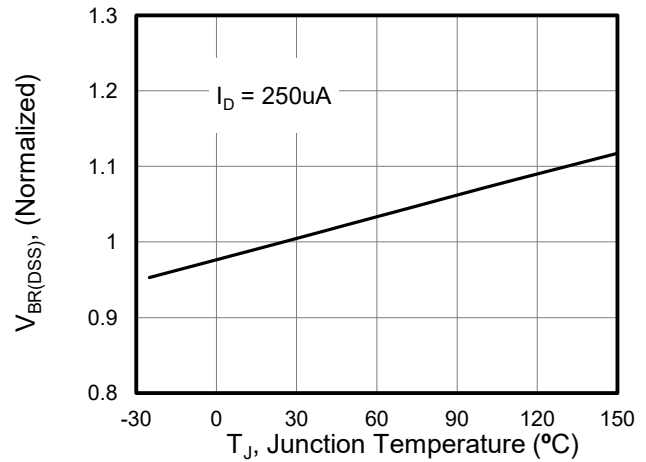


Figure 9. Transient Thermal Impedance

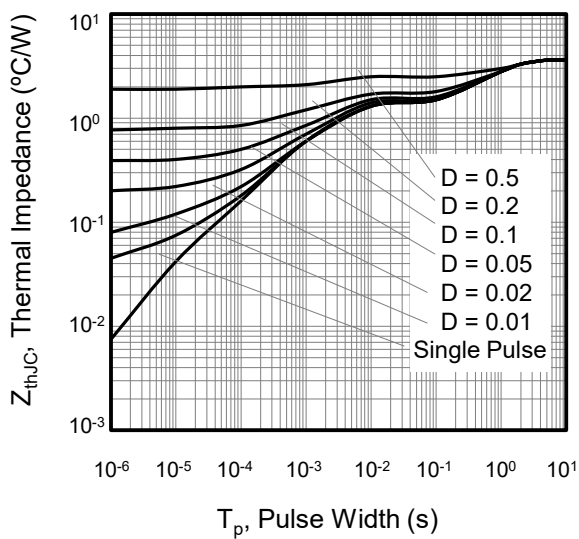
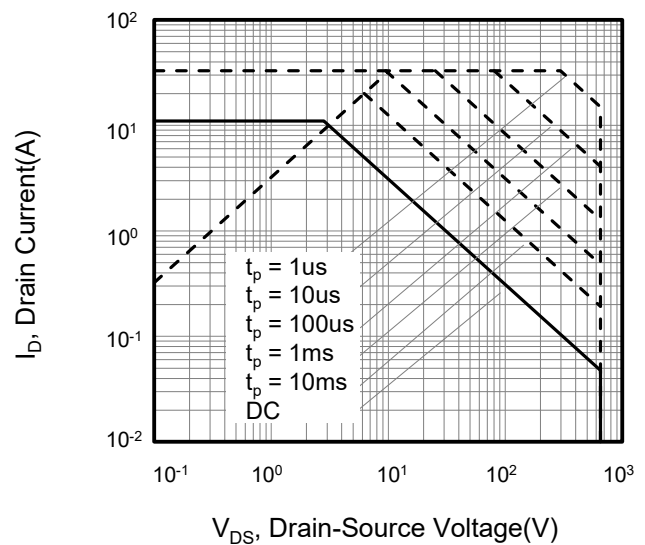


Figure 10. Safe operation area



• Test Circuit and Waveforms

Figure A: Gate Charge Test Circuit and Waveform

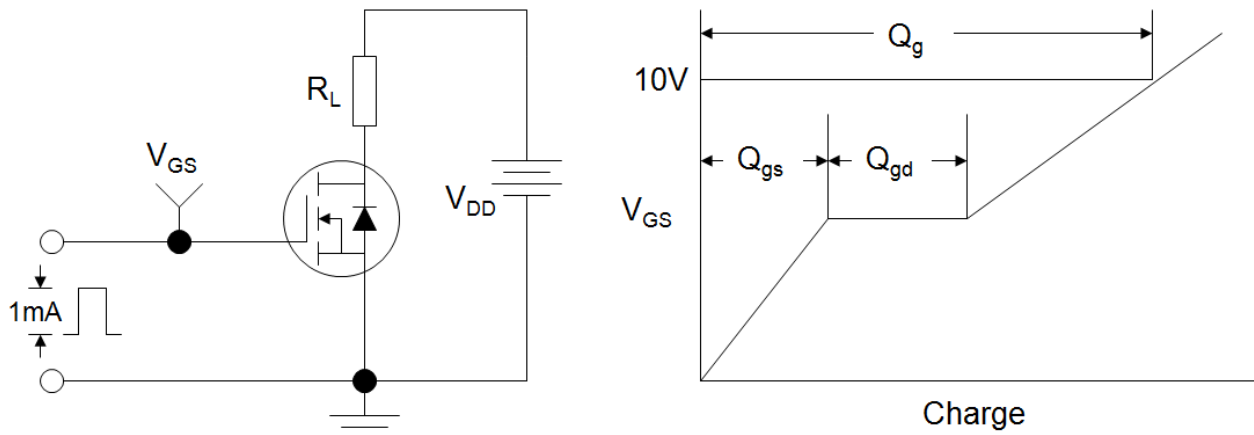


Figure B: Resistive Switching Test Circuit and Waveform

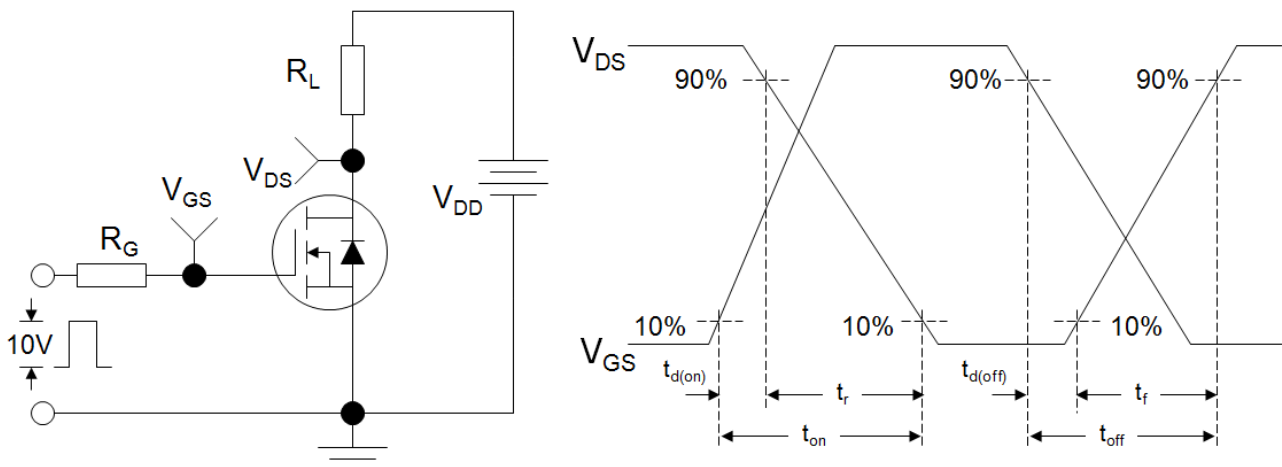
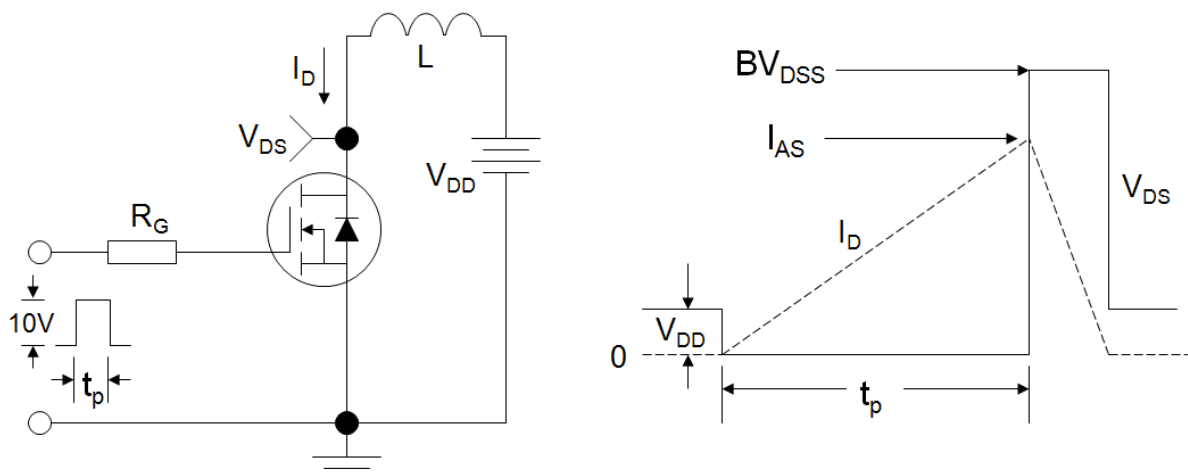


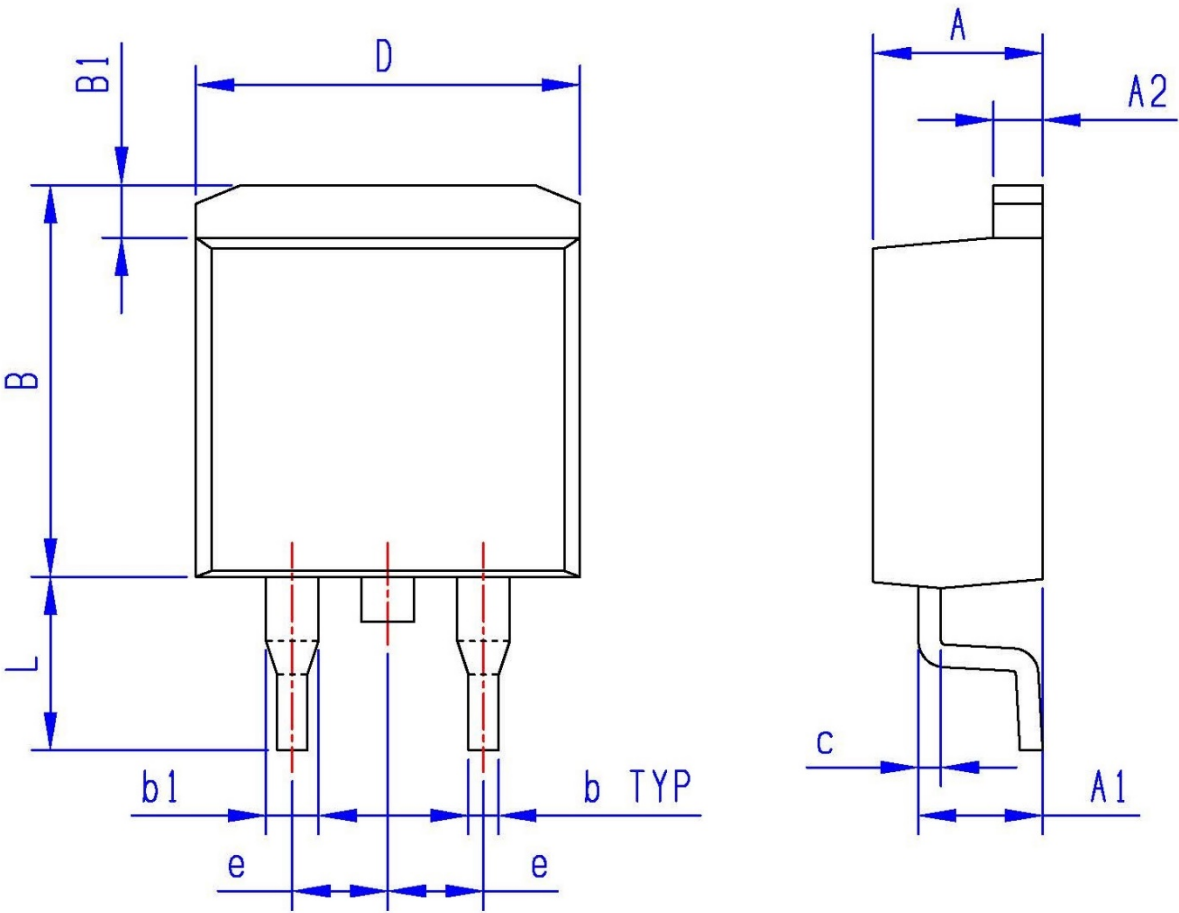
Figure C: Unclamped Inductive Switching Test Circuit and Waveform



• Dimensions (TO-263)

Unit: mm

SYMBOL	min	max	SYMBOL	min	max
A	4.25	4.85	B1	1.20	1.80
A1	2.30	3.00	e	2.40	2.70
A2	1.20	1.40	L	4.80	5.60
b	0.60	0.90			
b1	1.10	1.70			
c	0.40	0.70			
D	9.80	10.60			
B	10.40	11.40			



• Dimensions (DFN5*6)

Unit: mm

SYMBOL	min	max	SYMBOL	min	max
A	1.00	1.20	e	1.27BSC	
b	0.30	0.50	L	0.05	0.30
c	0.20	0.30	L1	0.40	0.80
D	4.80	5.20	L2	1.20	2.00
D1	3.90	4.30	H	3.30	3.80
E	5.50	5.90	I	—	0.18
E1	5.90	6.40			

