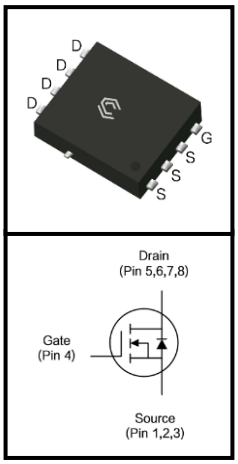
40V N-Channel MOSFET

FEATURES

- Super Low Gate Charge
- 100% EAS Guaranteed
- RoHS compliant
- Green Device Available
- Excellent C*dV/dt effect decline
- Advanced high cell density Trench technology



APPLICATIONS

- Load Switching
- Hard switched and high frequence circuits
- Uninterruptible power supply

RoHS

Device Marking and Package Information

Device	Package	Marking
CSN04N2P1	PDFN5×6	CSN04N2P1

Absolute Maximum Ratings T_C = 25℃, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage (V_{GS} = 0V)		V_{DSS}	40	V
Continuous Drain Current		I_D	160	A
Pulsed Drain Current	(note1)	I_{DM}	640	A
Gate-Source Voltage		V_{GSS}	± 20	V
Single Pulse Avalanche Energy	(note2)	E_{AS}	198.8	mJ
Avalanche Current	(note1)	I_{AS}	23.4	A
Repetitive Avalanche Energy	(note1)	E_{AR}	0.8	mJ
Power Dissipation (T_C = 25℃)		P_D	108.3	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	℃

Thermal Resistance

Parameter		Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	(note3)	R_{thJC}	1.15	℃/W
Thermal Resistance, Junction-to-Ambient		R_{thJA}	62.5	

Specifications T_J = 25℃, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, V_{GS} = 0V, T_J = 25℃	--	--	1	uA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	--	2.5	V
Drain-Source On-Resistance (note4)	$R_{DS(on)}$	V_{GS} = 10V, I_D =20A	--	1.6	2.1	mΩ
		V_{GS} = 4.5V, I_D =15A	--	2.2	2.8	mΩ
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1.0MHz	--	3403	--	pF
Output Capacitance	C_{oss}		--	1683	--	
Reverse Transfer Capacitance	C_{rss}		--	114	--	
Gate Resistance	R_g	V_{GS} = 0V,f = 1 MHz	--	2.00	--	Ω
Total Gate Charge	Q_g	V_{DD} = 32V, I_D = 50A, V_{GS} = 10V	--	60.9	--	nC
Gate-Source Charge	Q_{gs}		--	5.4	--	
Gate-Drain Charge	Q_{gd}		--	9.0	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} =20V, I_D = 50A, R_G = 3.1Ω	--	13	--	ns
Turn-on Rise Time	t_r		--	35	--	
Turn-off Delay Time	$t_{d(off)}$		--	48	--	
Turn-off Fall Time	t_f		--	20	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ℃	--	--	160	A
Pulsed Diode Forward Current	I_{SM}		--	--	640	
Body Diode Voltage	V_{SD}	T_J = 25℃, I_{SD} = 20A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Time	t_{rr}	V_{DD} = 20V,I_S = 50A, di_F/dt =100A / μ s	--	61	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.027	--	uC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=0.5mH, V_{DD} = 20V, R_G = 25 Ω, Starting T_J = 25 ℃
3. Reference standard for thermal resistance testing: JESD51-14
4. Pulse Test: Pulse width ≤ 300 μ s, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25℃, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25℃)

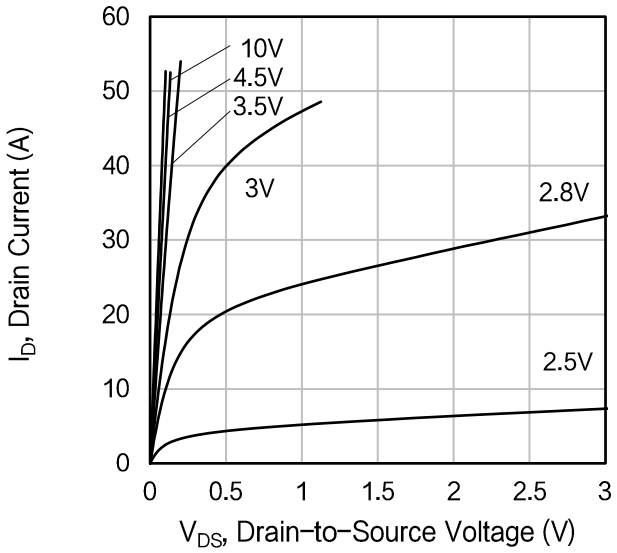


Figure 2. Body Diode Forward Voltage

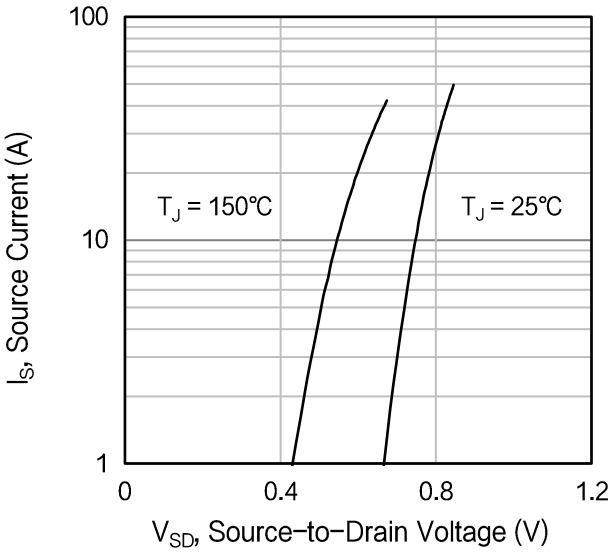


Figure 3. Drain Current vs. Temperature

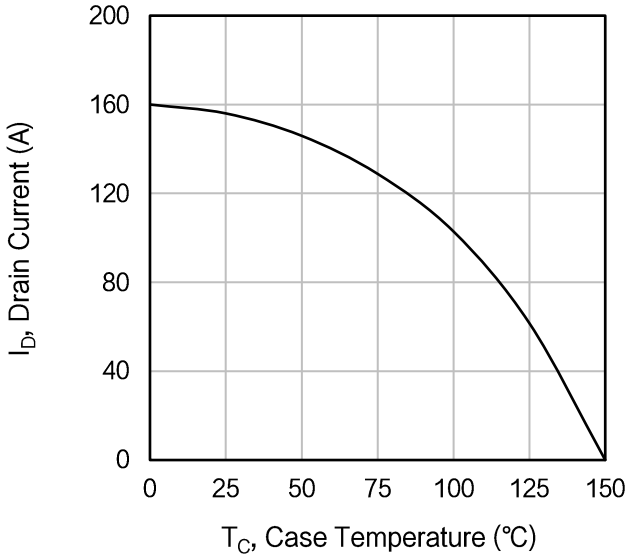


Figure 4. BV_{DSS} Variation vs. Temperature

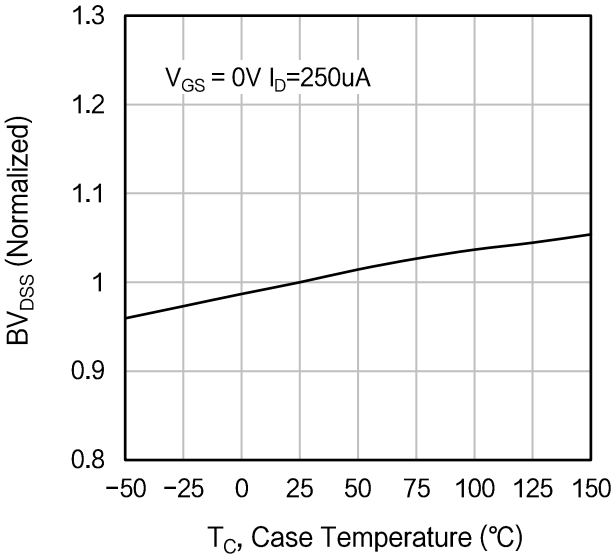


Figure 5. Transfer Characteristics

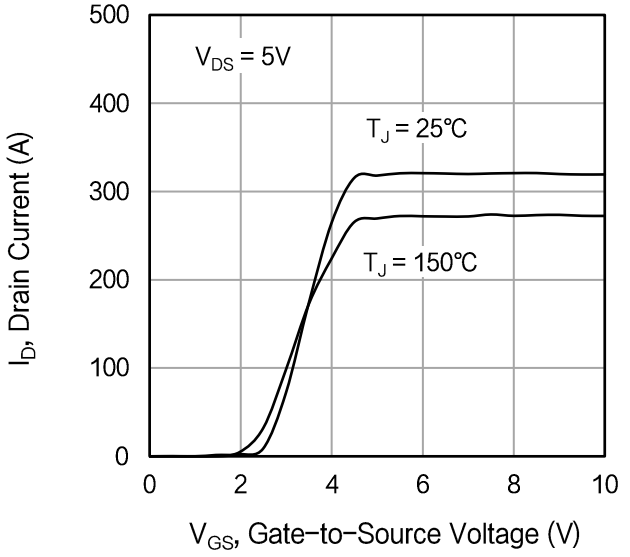
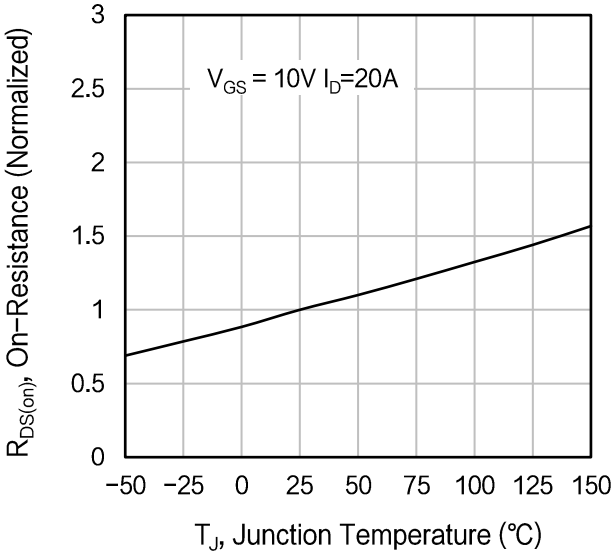


Figure 6. On-Resistance vs. Temperature



Typical Characteristics T_J = 25℃, unless otherwise noted

Fig.7 Threshold Voltage vs. Temperature

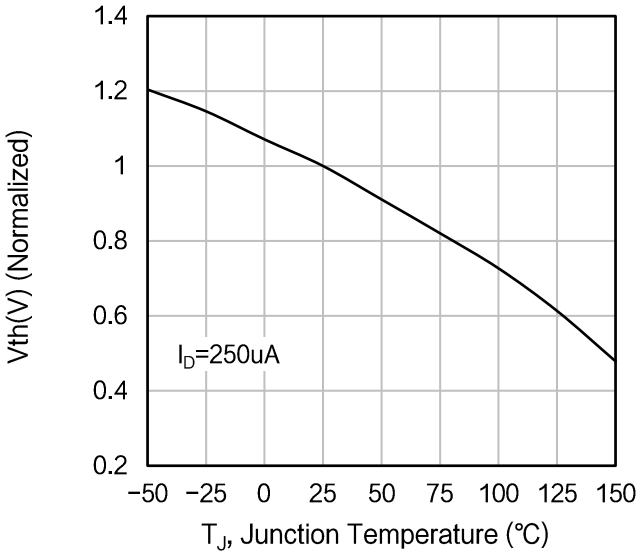


Figure 8. On−Resistance vs. Drain Current

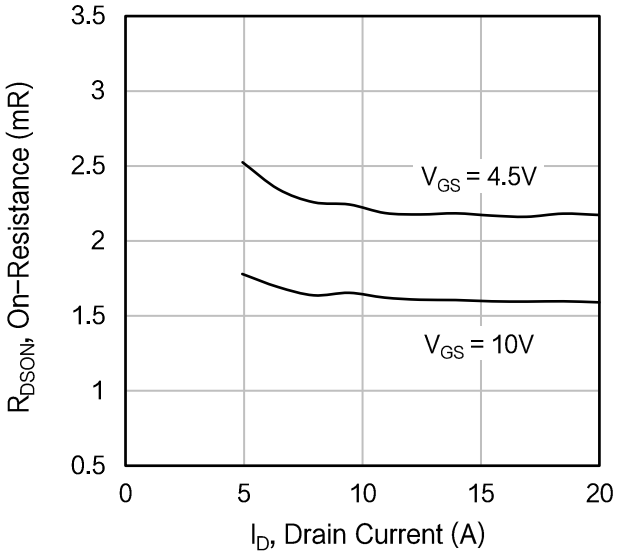


Figure 9. Capacitance

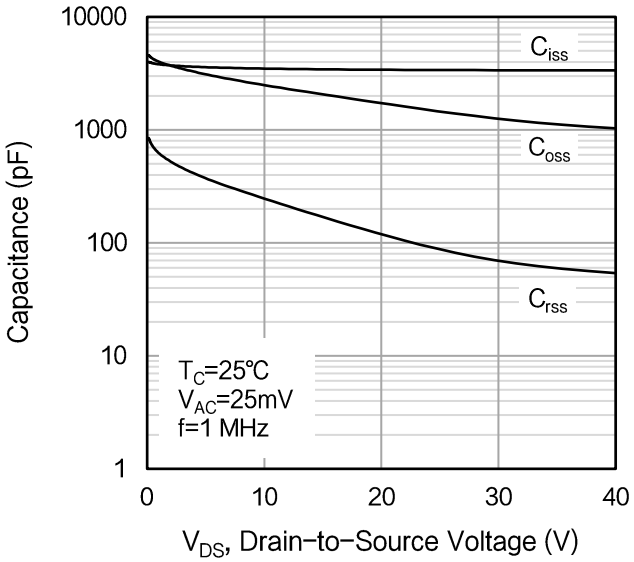


Figure 10. Gate Charge

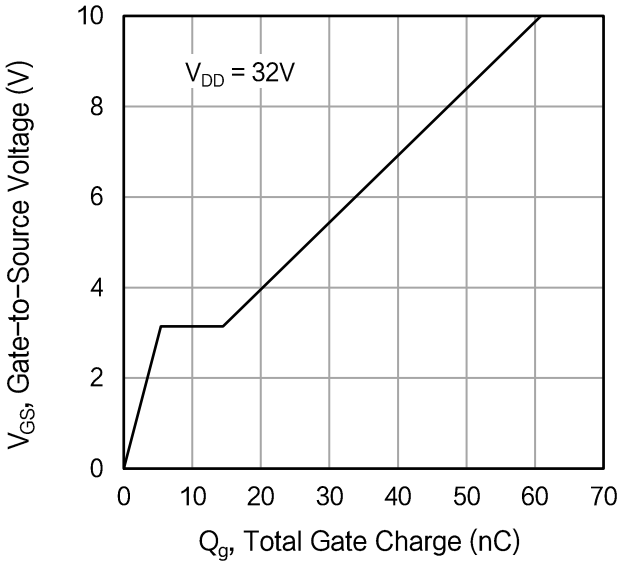


Figure 11. Safe Operating Area

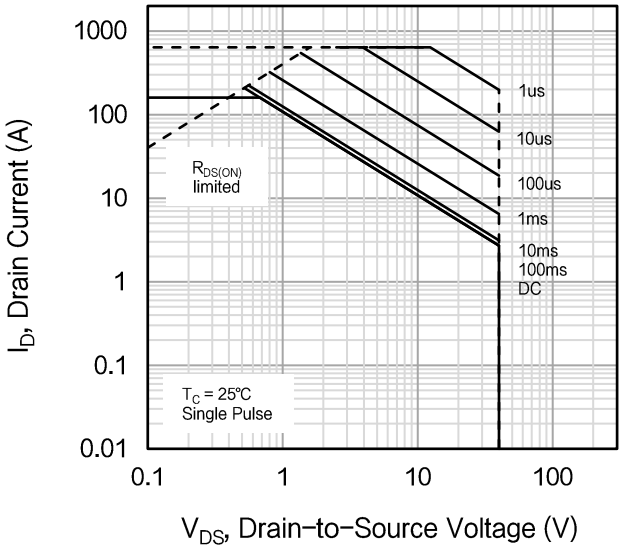
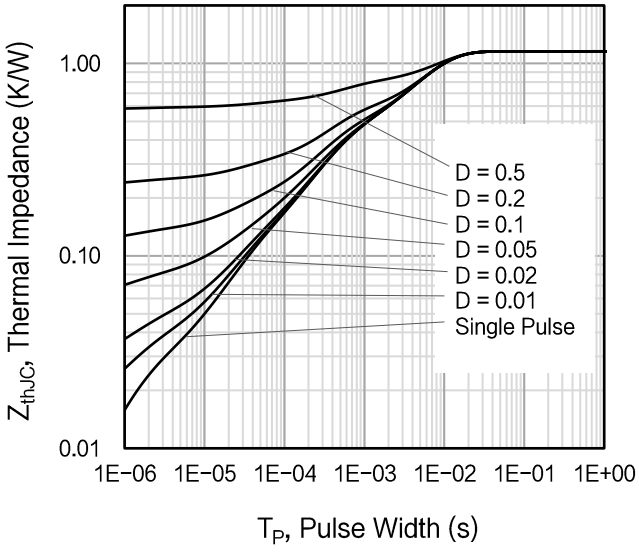


Figure 12. Transient Thermal Impedance



Typical Characteristics T_J = 25℃, unless otherwise noted

Fig.13 D-S Leakage Current vs. D-S Voltage

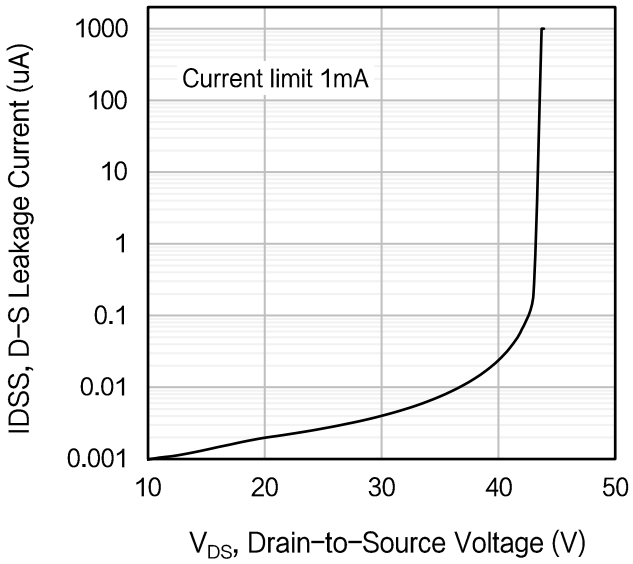


Figure 14. G-S Leakage Current vs. G-S Voltage

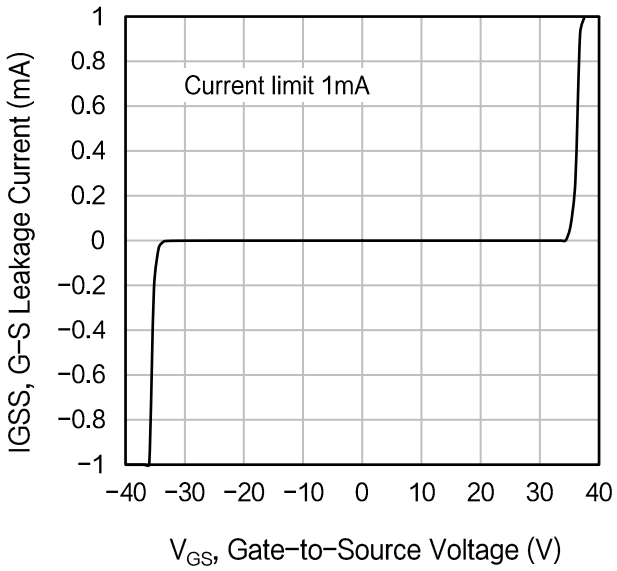


Figure A：Gate Charge Test Circuit and Waveform

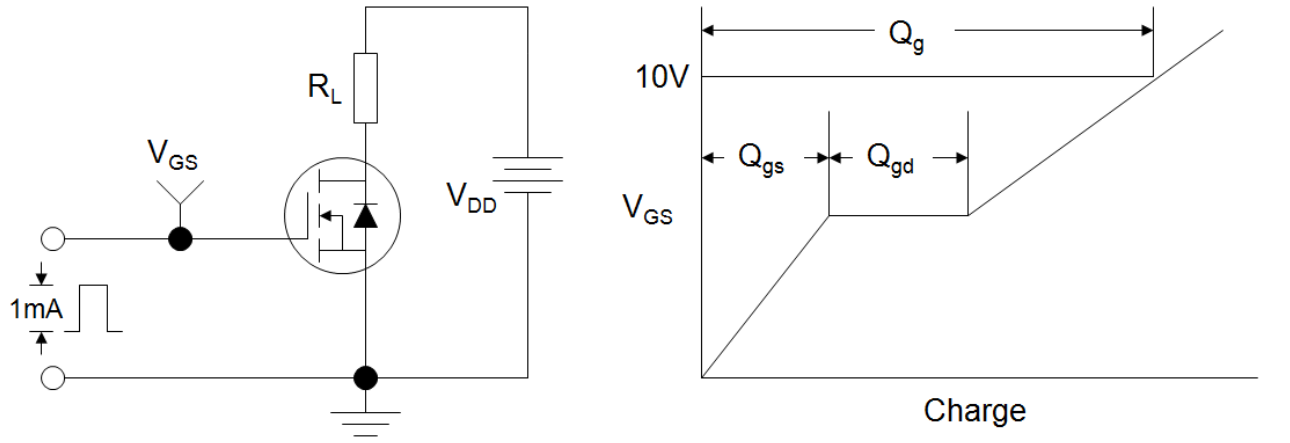


Figure B：Resistive Switching Test Circuit and Waveform

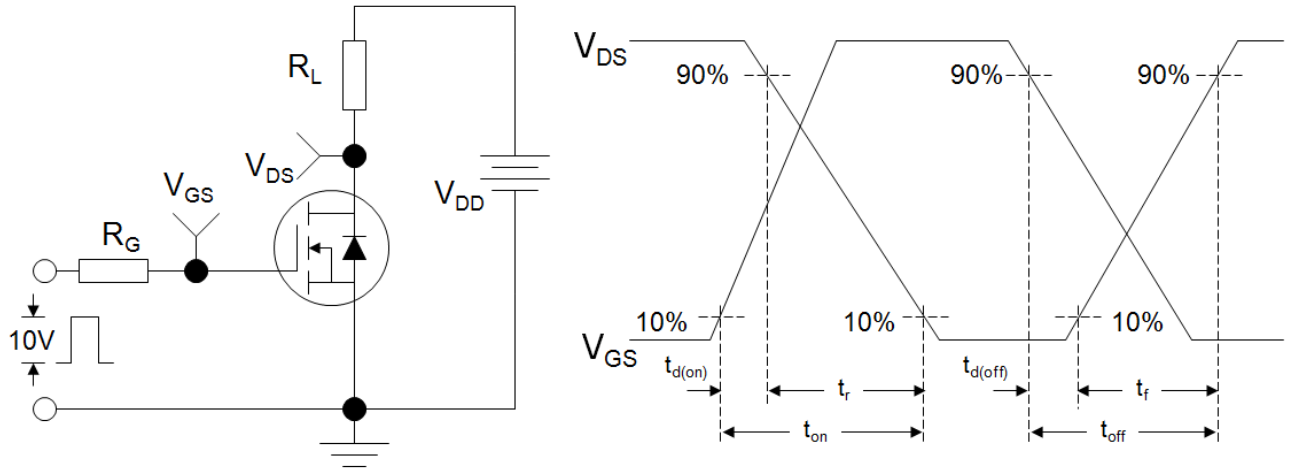
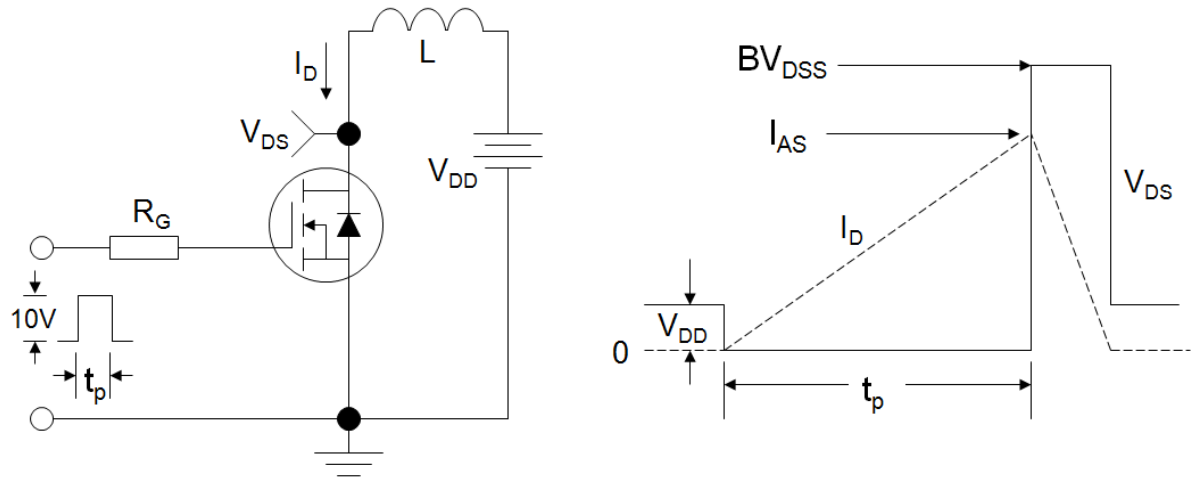
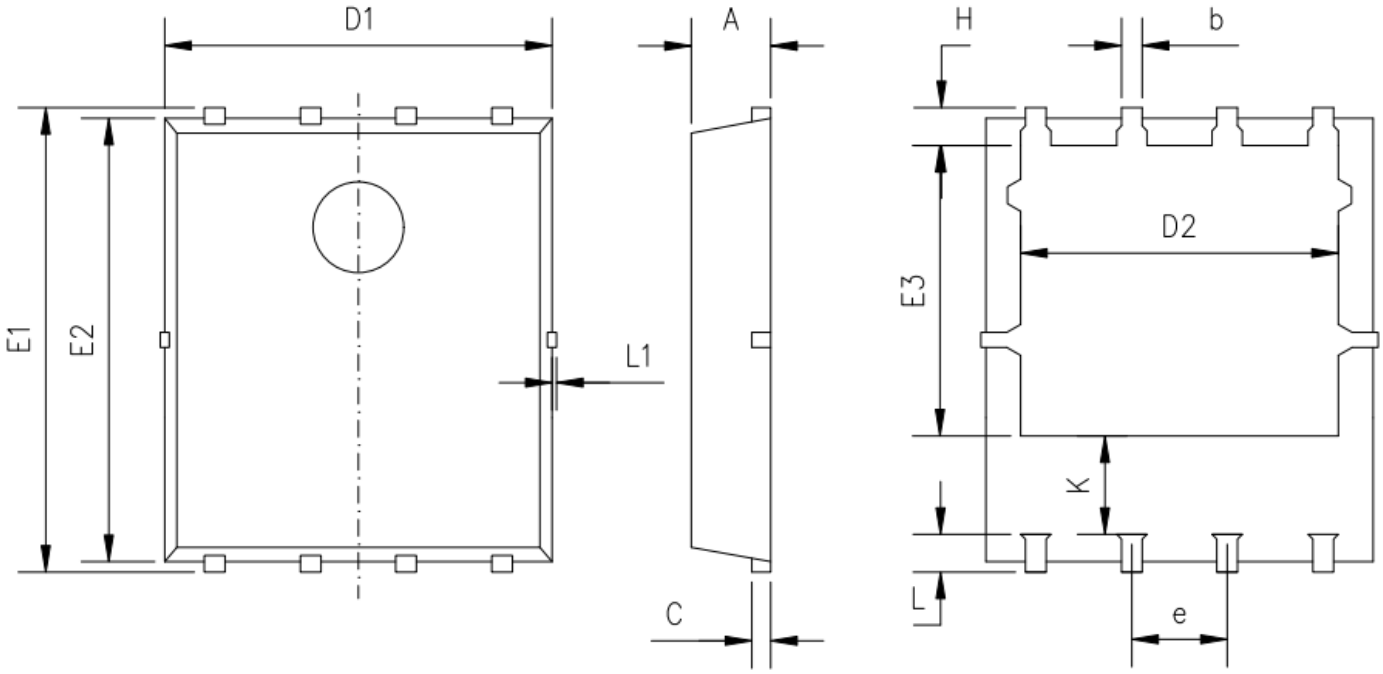


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



PDFN5×6



SYMBOLS	MILLIMETERS	
	MIN	MAX
A	0.90	1.20
b	0.25	0.50
C	0.10	0.35
D1	4.80	5.40
D2	3.72	4.25
e	1.17	1.37
E1	5.90	6.35
E2	5.60	6.06
E3	3.33	3.92
H	0.40	0.71
L	0.30	0.84
L1	0.00	0.15
K	1.00	1.50

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