650V N-Channel MOSFET

Features

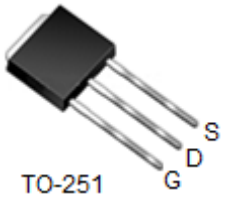
V_{DSS}	$R_{DS\,ON}$ @ 10V (Typ)	I_D
650V	4Ω	2A

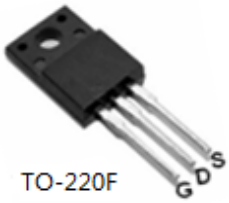
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS Compliant

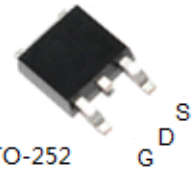
Application

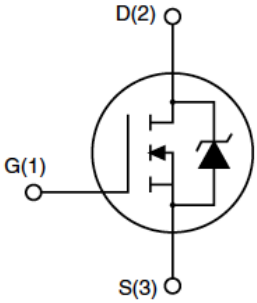
- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

Package









Ordering Information

Part Number	Marking	Case	Packaging
G2N65J	G2N65	TO-251	72pcs/Tube
G2N65F	G2N65	TO-220F	50pcs/Tube
G2N65K	G2N65	TO-252	2500pcs/Reel

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value			Unit
		TO-220F	TO-251	TO-252	
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	650			V
Continuous Drain Current	I_D	2			A
Pulsed Drain Current (note1)	I_{DM}	6			A
Gate-Source Voltage	V_{GSS}	±30			V
Single Pulse Avalanche Energy (note2)	E_{AS}	28.8			mJ
Avalanche Current (note1)	I_{AS}	2.4			A
Repetitive Avalanche Energy (note1)	E_{AR}	17.28			mJ
Power Dissipation (T_C = 25ºC)	P_D	20	25		W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150			ºC

Thermal Resistance

Parameter	Symbol	Value			Unit
		TO-220F	TO-251	TO-252	
Thermal Resistance, Junction-to-Case	R_{thJC}	6.25	5		K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60		

Specifications T_J = 25ºC, 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	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 1.0A	--	4	4.8	Ω
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	250	--	pF
Output Capacitance	C_{oss}		--	30	--	
Reverse Transfer Capacitance	C_{rss}		--	4.2	--	
Total Gate Charge	Q_g	V_{DD} = 520V, I_D = 2.0A, V_{GS} = 10V	--	10.6	--	nC
Gate-Source Charge	Q_{gs}		--	1.5	--	
Gate-Drain Charge	Q_{gd}		--	5.8	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 300V, I_D = 2.0A, R_G = 25 Ω	--	33.6	--	ns
Turn-on Rise Time	t_r		--	7.2	--	
Turn-off Delay Time	$t_{d(off)}$		--	64	--	
Turn-off Fall Time	t_f		--	31	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ºC	--	--	2	A
Pulsed Diode Forward Current	I_{SM}		--	--	8	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 1.0A, V_{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V, I_S = 2.0A, di_F/dt =100A /μs	--	500	--	ns
Reverse Recovery Charge	Q_{rr}		--	6	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 10.0mH, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25 ºC
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

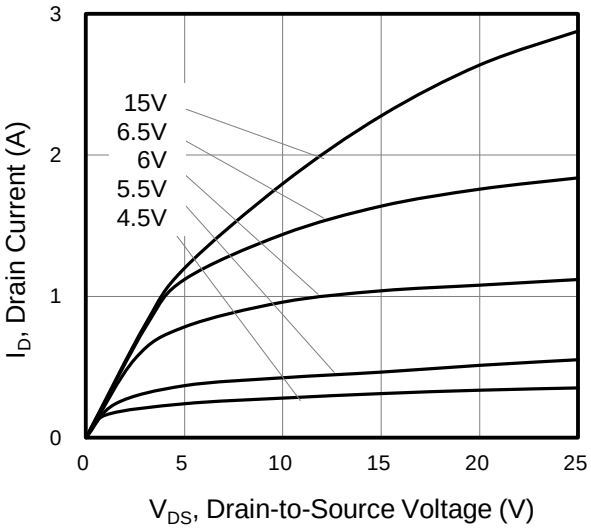


Figure 2. Body Diode Forward Voltage

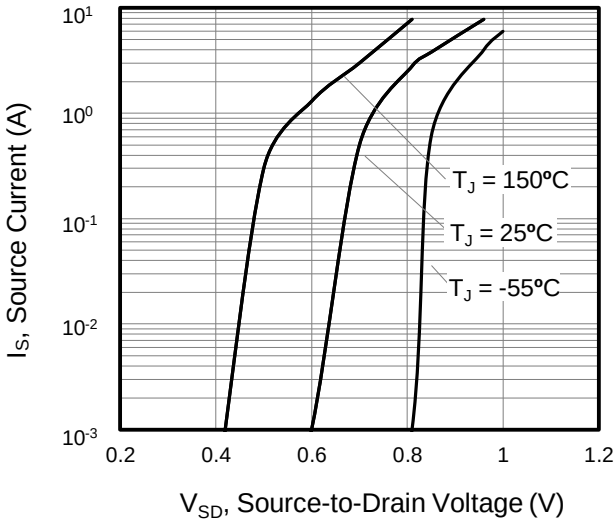


Figure 3. Drain Current vs. Temperature

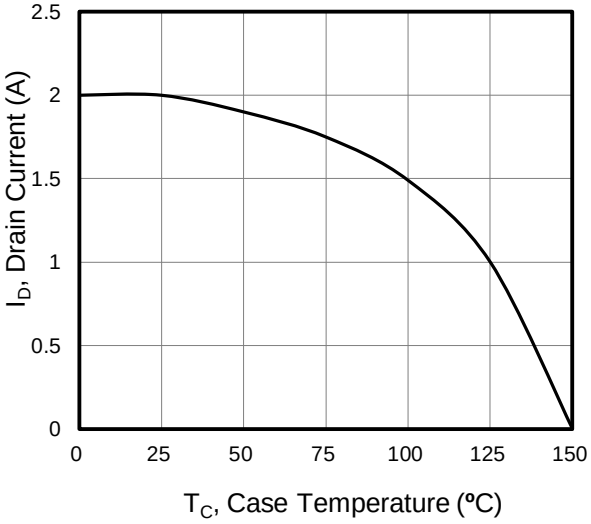


Figure 4. Power Dissipation vs. Temperature TO-251,TO-252

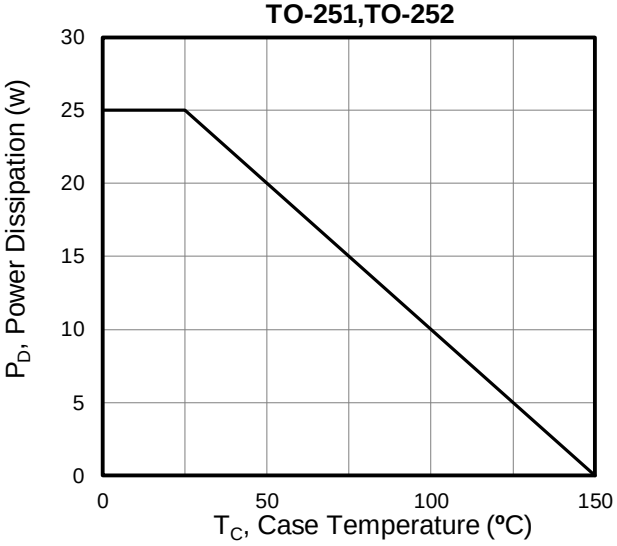


Figure 5. Transfer Characteristics

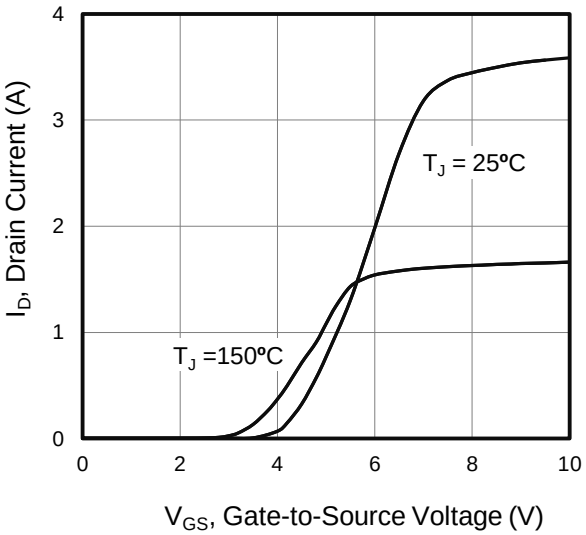
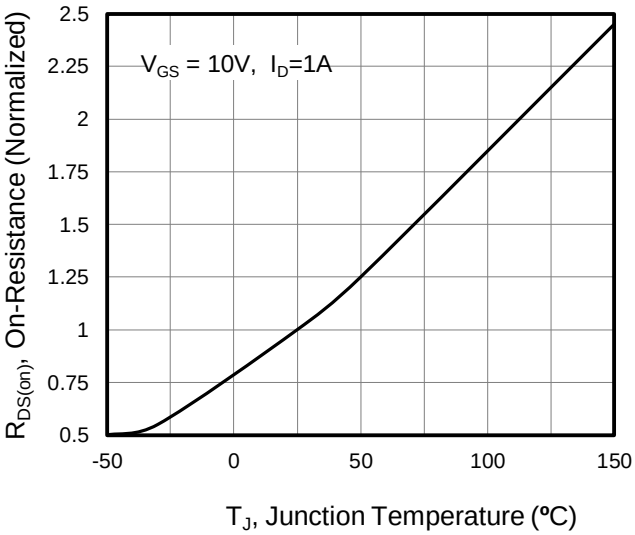


Figure 6. On-Resistance vs. Temperature



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Capacitance

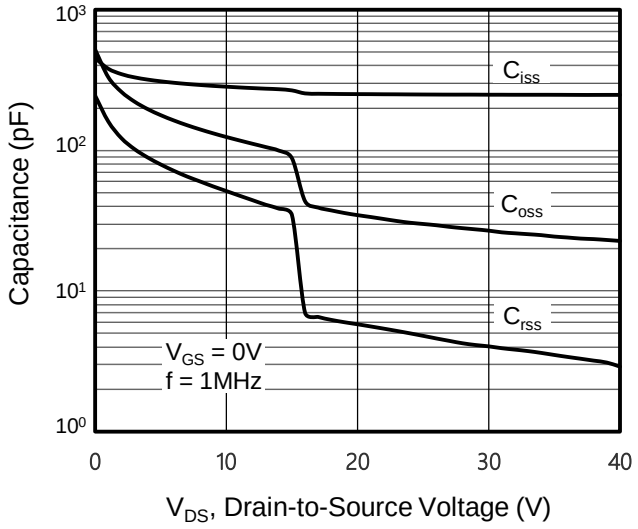


Figure 8. Gate Charge

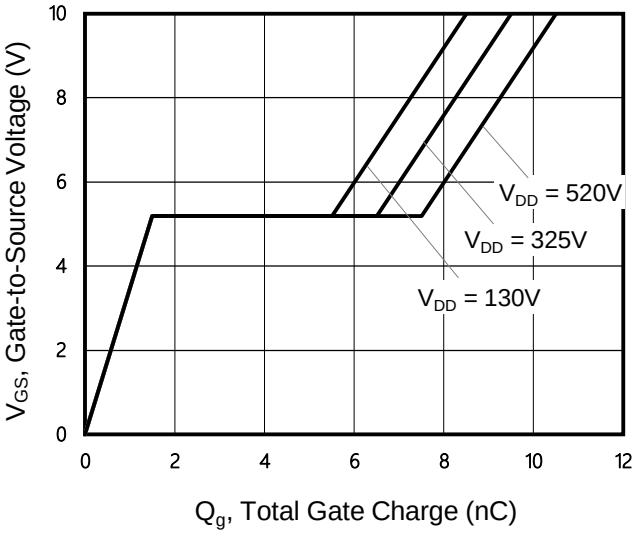


Figure 9. Transient Thermal Impedance TO-251,TO-252

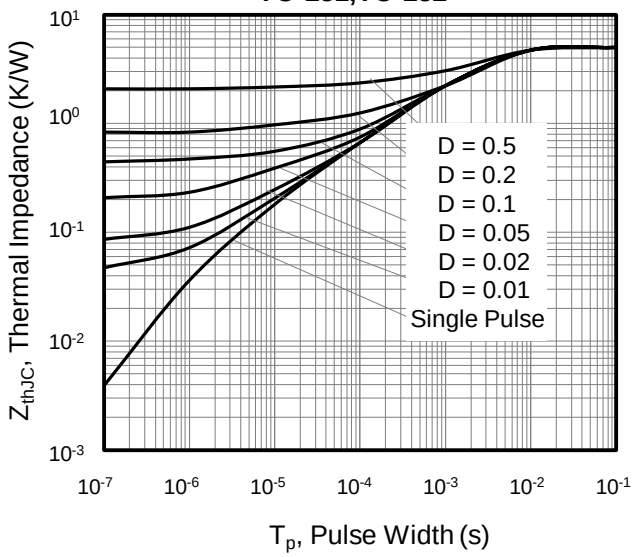


Figure 10. Transient Thermal Impedance TO-220F

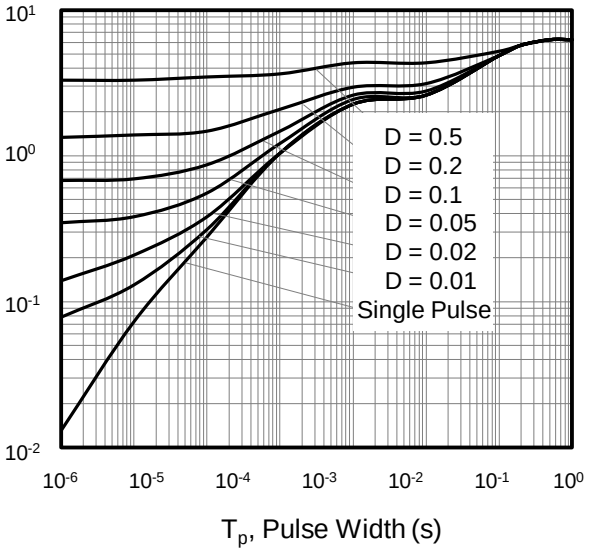


Figure A：Gate Charge Test Circuit and Waveform

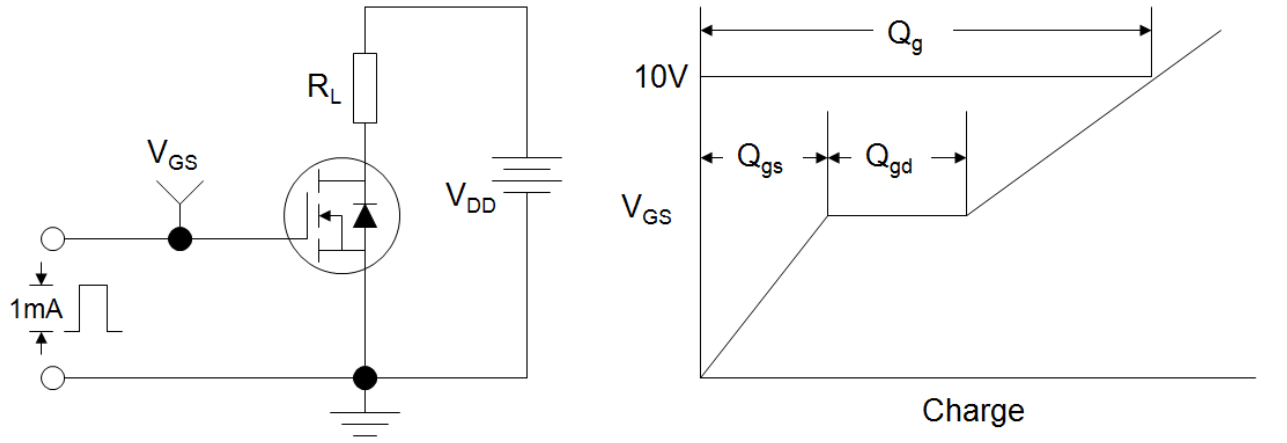


Figure B：Resistive Switching Test Circuit and Waveform

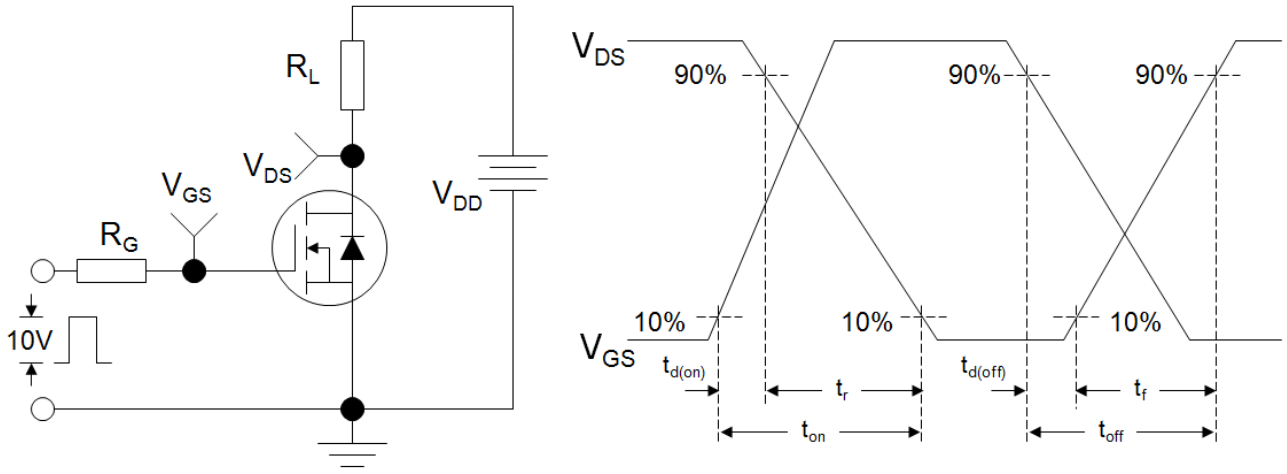
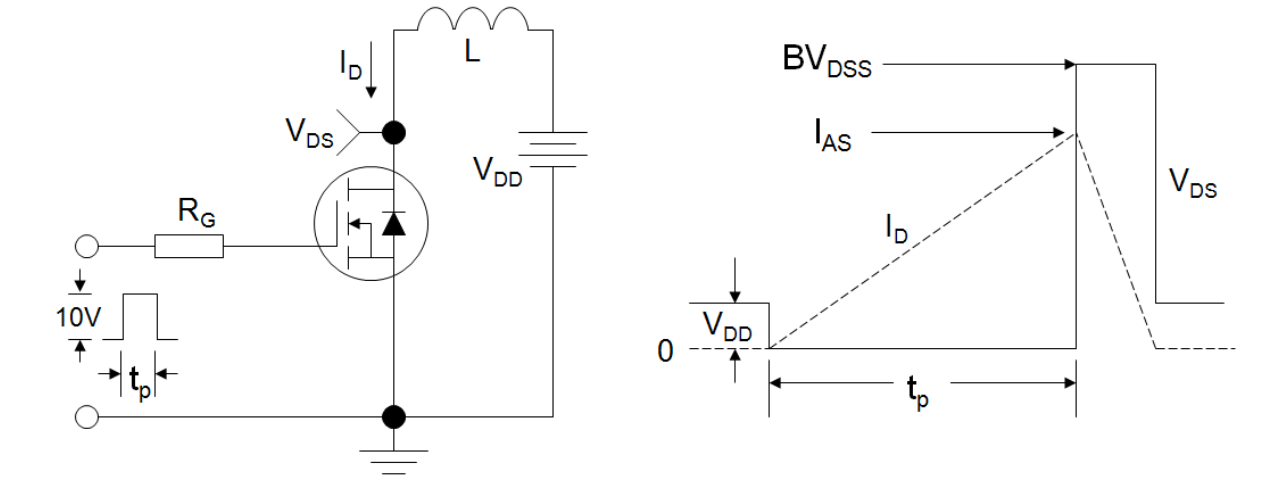
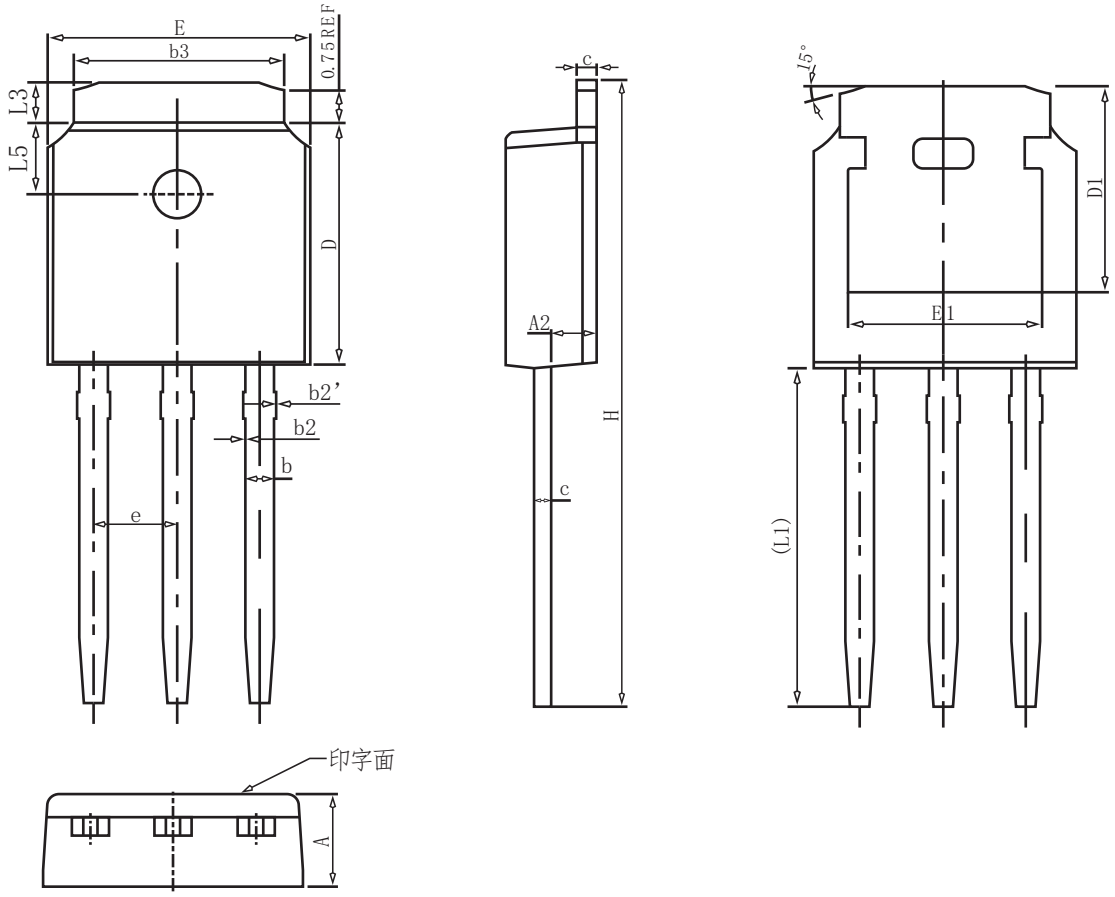


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



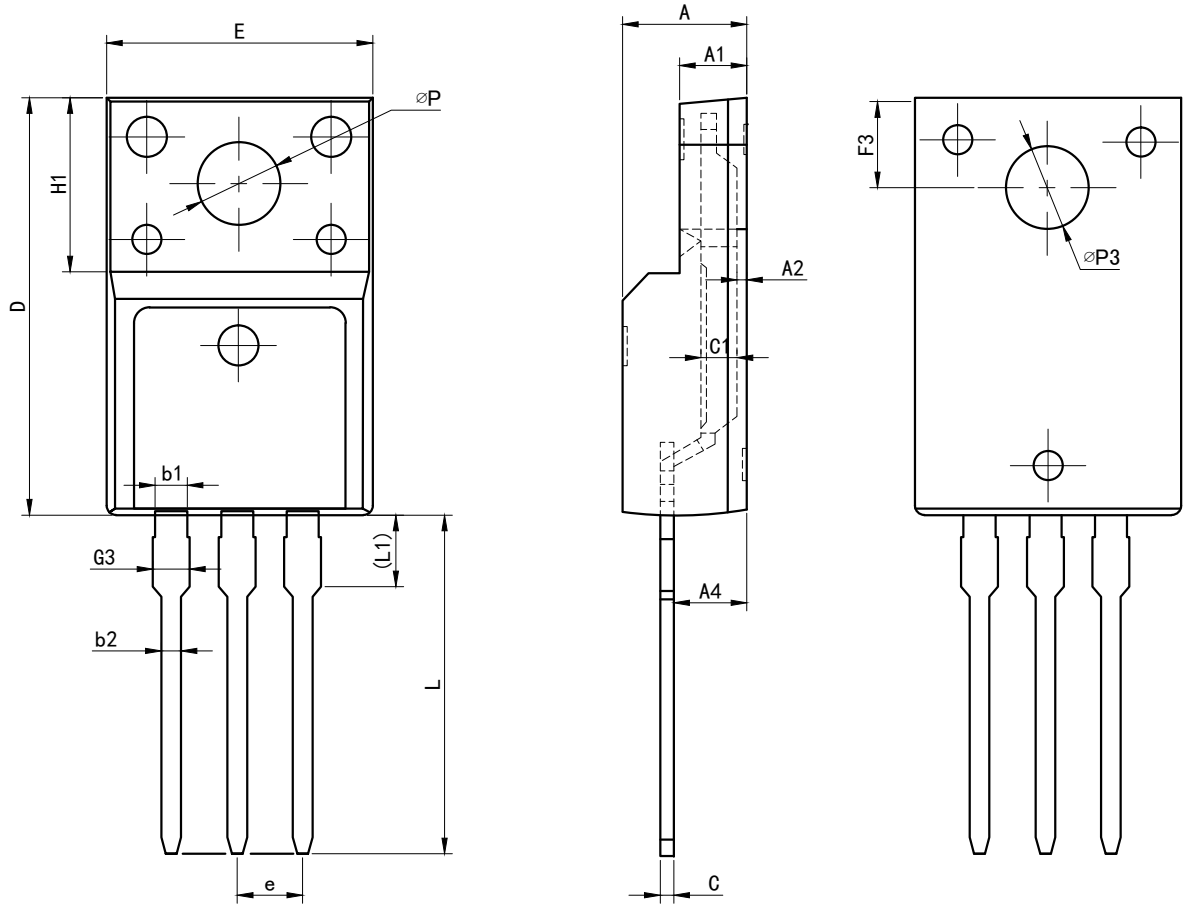
TO-251 Package information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2'	0.00	0.04	0.10
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	–	–
e	2.286BSC		
H	16.22	16.52	16.82
L1	9.15	9.40	9.65
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

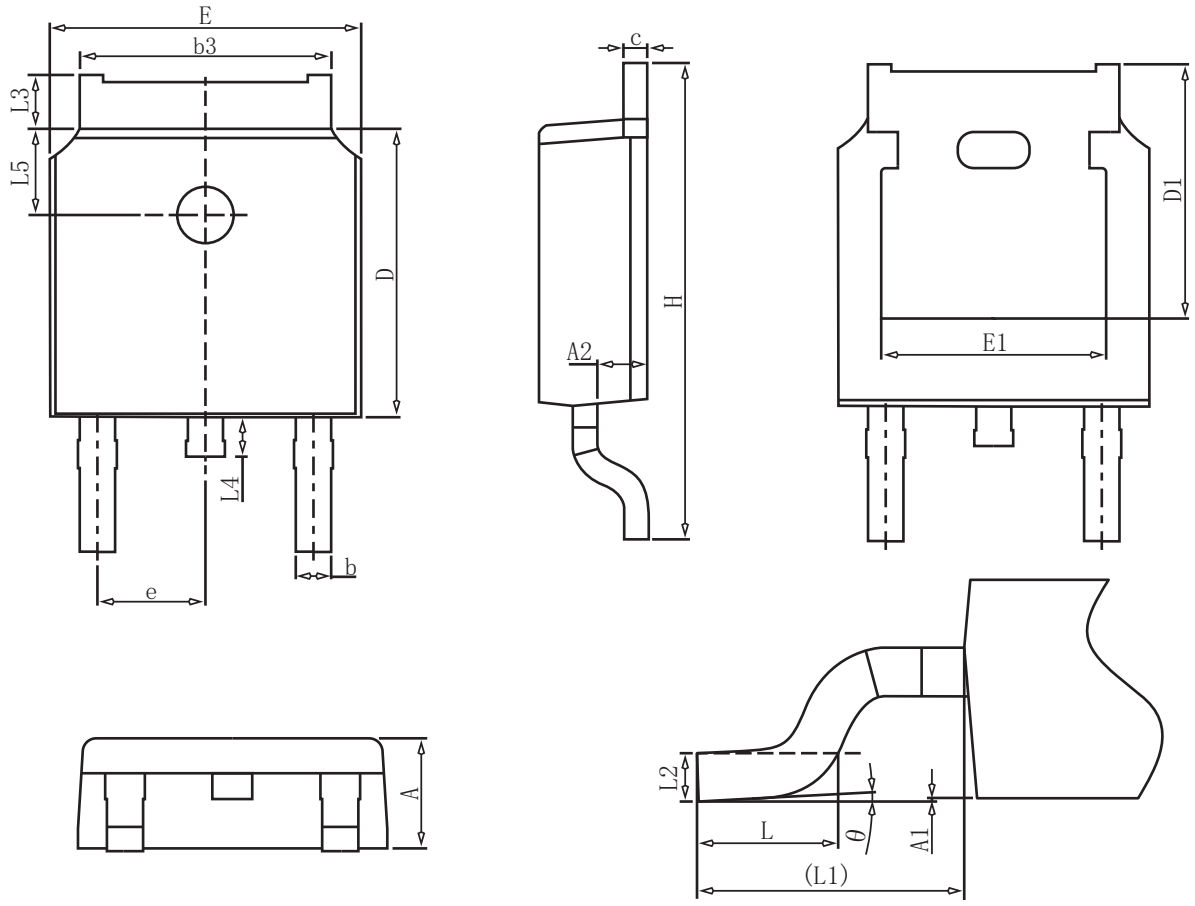
TO-220F Package information



COMMOND I MENS I ONS

SYMBO	mm		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.30	0.45	0.60
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
c1	1.20	1.30	1.35
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
L	12.68	12.98	13.28
L1	2.93	3.03	3.13
øP	3.03	3.18	3.38
øP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

TO-252 Package information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	–	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	–	–
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	–	1.28
L4	0.50	–	1.00
L5	1.65	1.80	1.95
θ	0°	–	8°