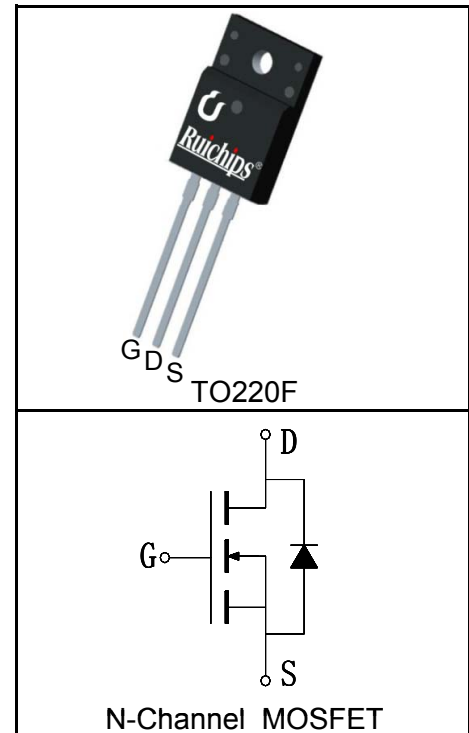


Features

- 650V/9A,
 $R_{DS(ON)} = 750m\Omega(Typ.)@V_{GS}=10V$
- Low Reverse Transfer
- Ultra Low Gate Charge
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)



Pin Description



Applications

- AC/DC Power Conversion in Switched Mode Power Supplies (SMPS)
- Adapter
- PWM Motor Controls

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
Common Ratings ($T_C=25^\circ C$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	650	V
V_{GSS}	Gate-Source Voltage	± 30	
T_J	Maximum Junction Temperature	150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$ 9	A
Mounted on Large Heat Sink			
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ C$ 36	A
$I_D^{②}$	Continuous Drain Current($V_{GS}=10V$)	$T_C=25^\circ C$ 9	A
		$T_C=100^\circ C$ 5.5	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$ 43	W
		$T_C=100^\circ C$ 17	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.9	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	$^\circ C/W$
Drain-Source Avalanche Ratings			
$E_{AS}^{③}$	Avalanche Energy, Single Pulsed	245	mJ

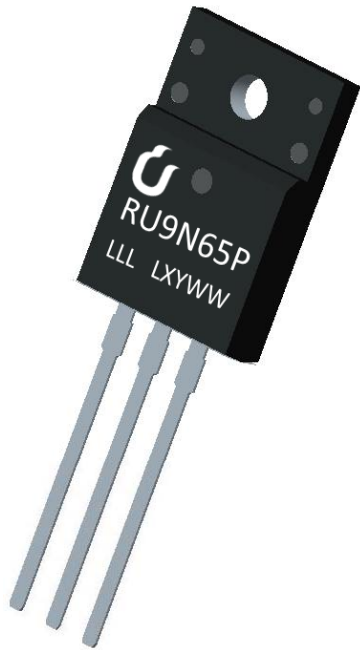
Electrical Characteristics ($T_C=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RU9N65P			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	650			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$			1	μA
		$T_J=125^{\circ}\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2		4	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(4)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=1A$		650	1000	m Ω
Diode Characteristics						
$V_{SD}^{(4)}$	Diode Forward Voltage	$I_{SD}=4.5A, V_{GS}=0V$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=9A, di_{SD}/dt=100A/\mu s$		390		ns
Q_{rr}	Reverse Recovery Charge			2.7		μC
Dynamic Characteristics ⁽⁵⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		2.5		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=300V,$ Frequency=1.0MHz		1450		pF
C_{oss}	Output Capacitance			170		
C_{riss}	Reverse Transfer Capacitance			17		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=300V, R_L=100\Omega,$ $I_{DS}=9A, V_{GEN}=10V,$ $R_G=25\Omega$		41		ns
t_r	Turn-on Rise Time			80		
$t_{d(OFF)}$	Turn-off Delay Time			85		
t_f	Turn-off Fall Time			52		
Gate Charge Characteristics ⁽⁵⁾						
Q_g	Total Gate Charge	$V_{DS}=520V, V_{GS}=10V,$ $I_{DS}=9A$		35		nC
Q_{gs}	Gate-Source Charge			7		
Q_{gd}	Gate-Drain Charge			14		

- Notes:
- ① Pulse width limited by safe operating area.
 - ② Calculated continuous current based on maximum allowable junction temperature.
 - ③ Limited by $T_{Jmax}, I_{AS}=7A, V_{DD}=100V, R_G=50\Omega$, Starting $T_J=25^{\circ}\text{C}$.
 - ④ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 - ⑤ Guaranteed by design, not subject to production testing.

Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU9N65P	RU9N65P	TO220F	Tube	50	-	-



① The following characters could be different and means:

1st line : Ruichips Company Logo

2nd line : Part Number (RU9N65P)

3rd line: Date code (LLL LXYWW)

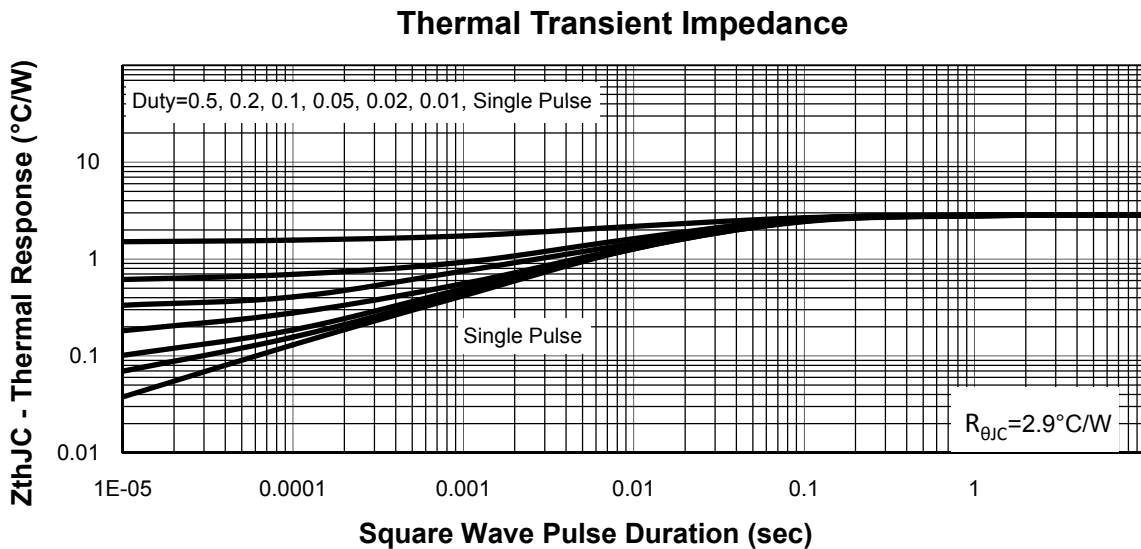
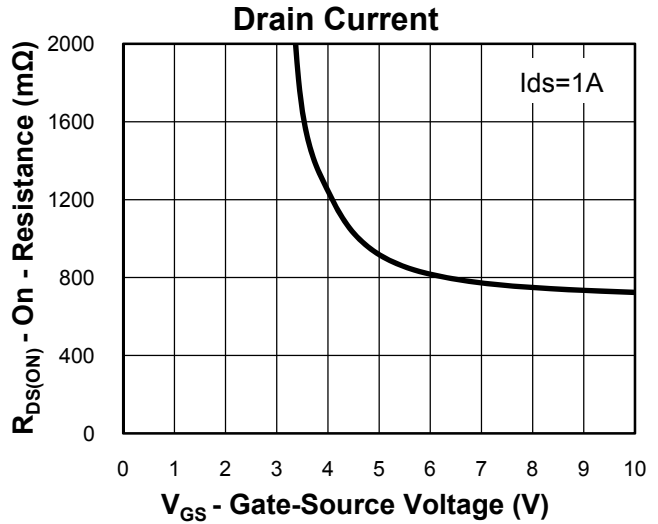
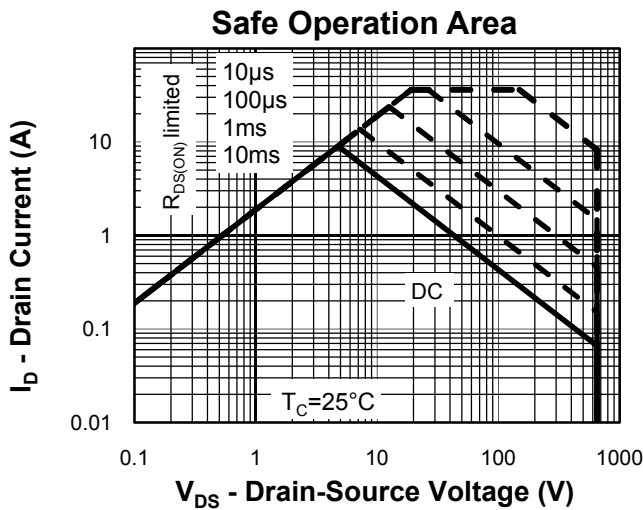
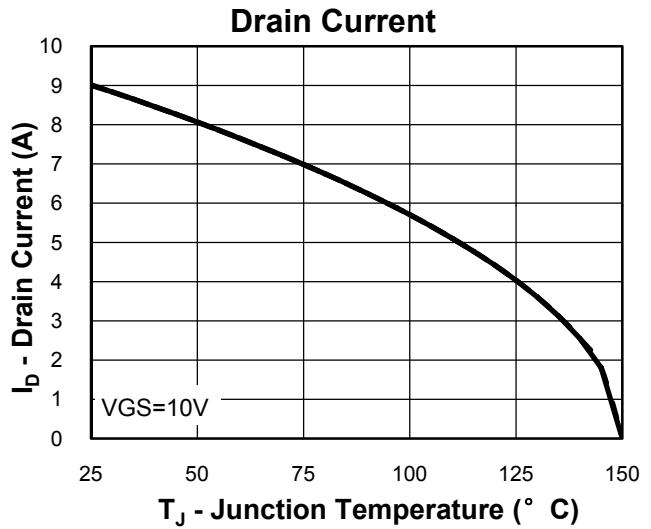
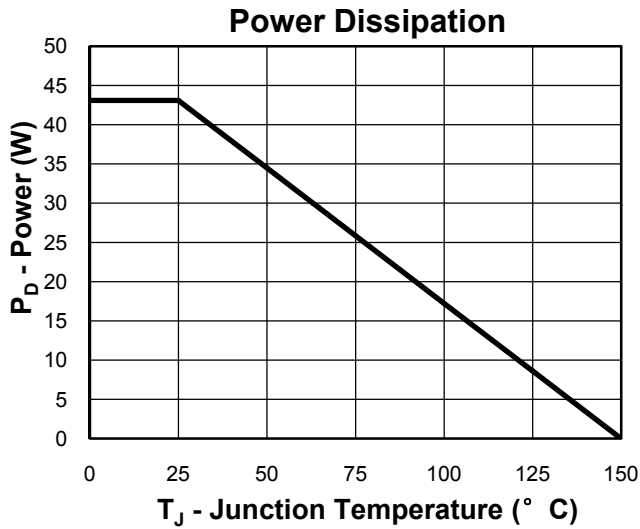
LLL L =Wafer Lot Number

X =Assembly site code

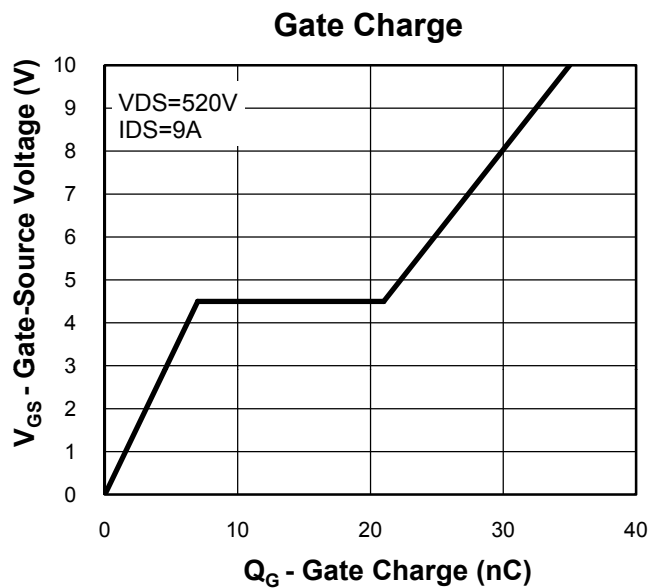
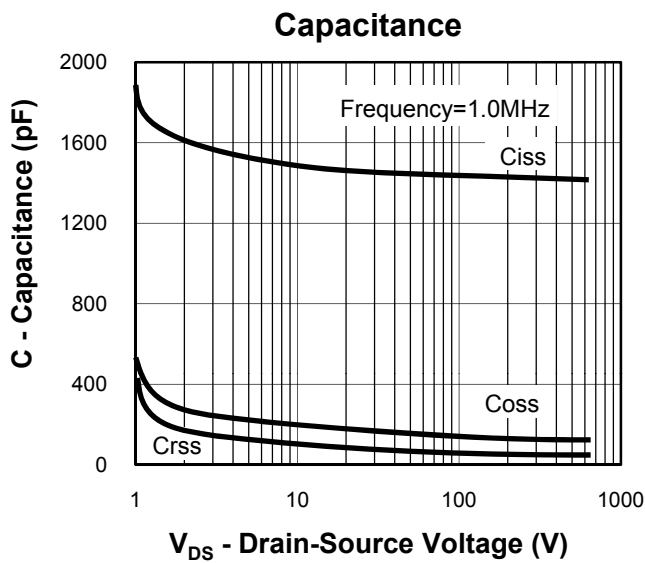
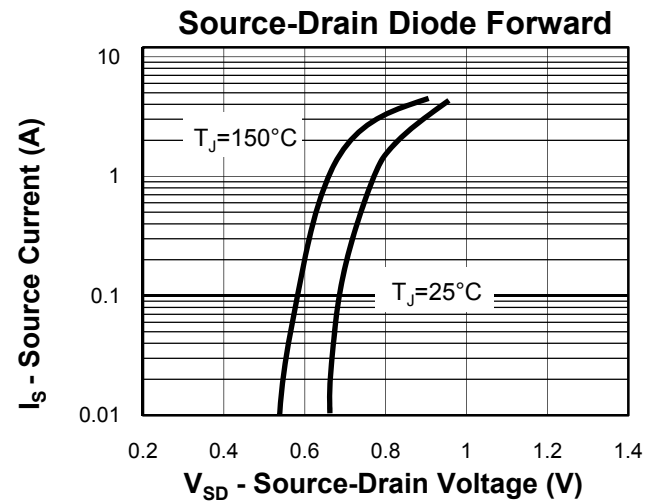
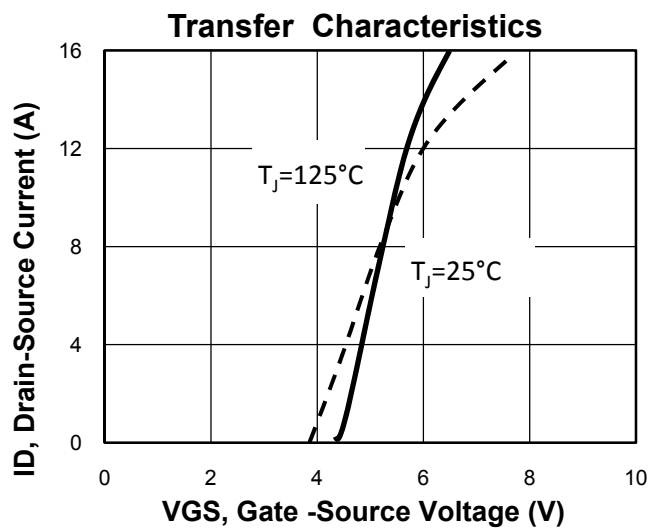
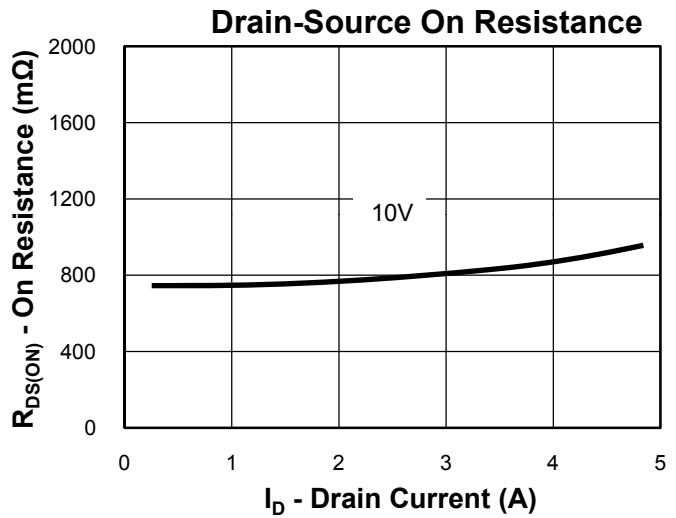
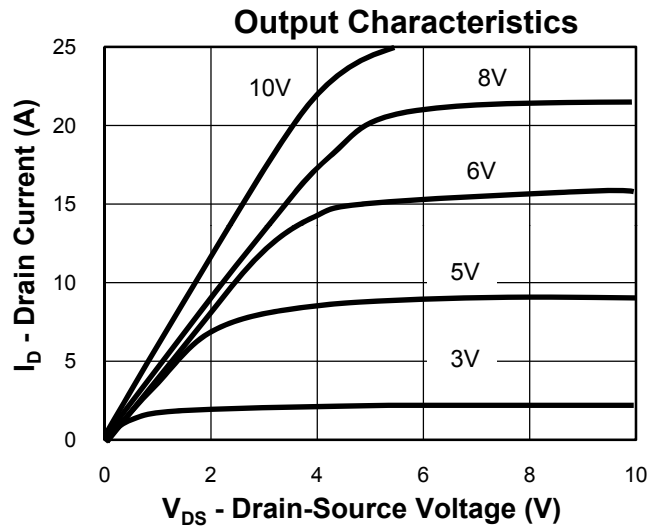
Y =Year

WW =Work Week

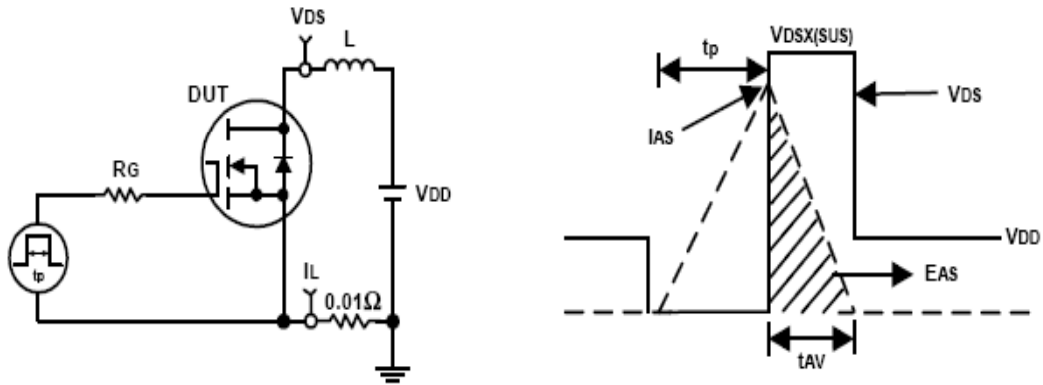
Typical Characteristics



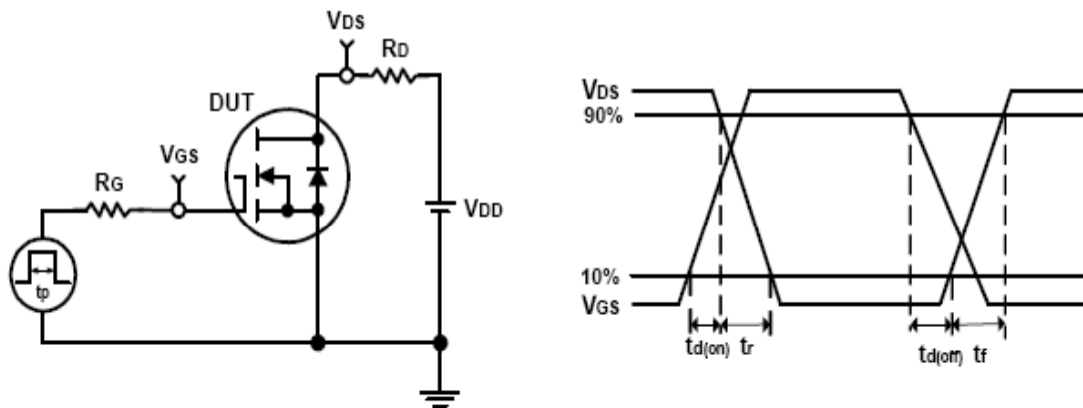
Typical Characteristics



Avalanche Test Circuit and Waveforms

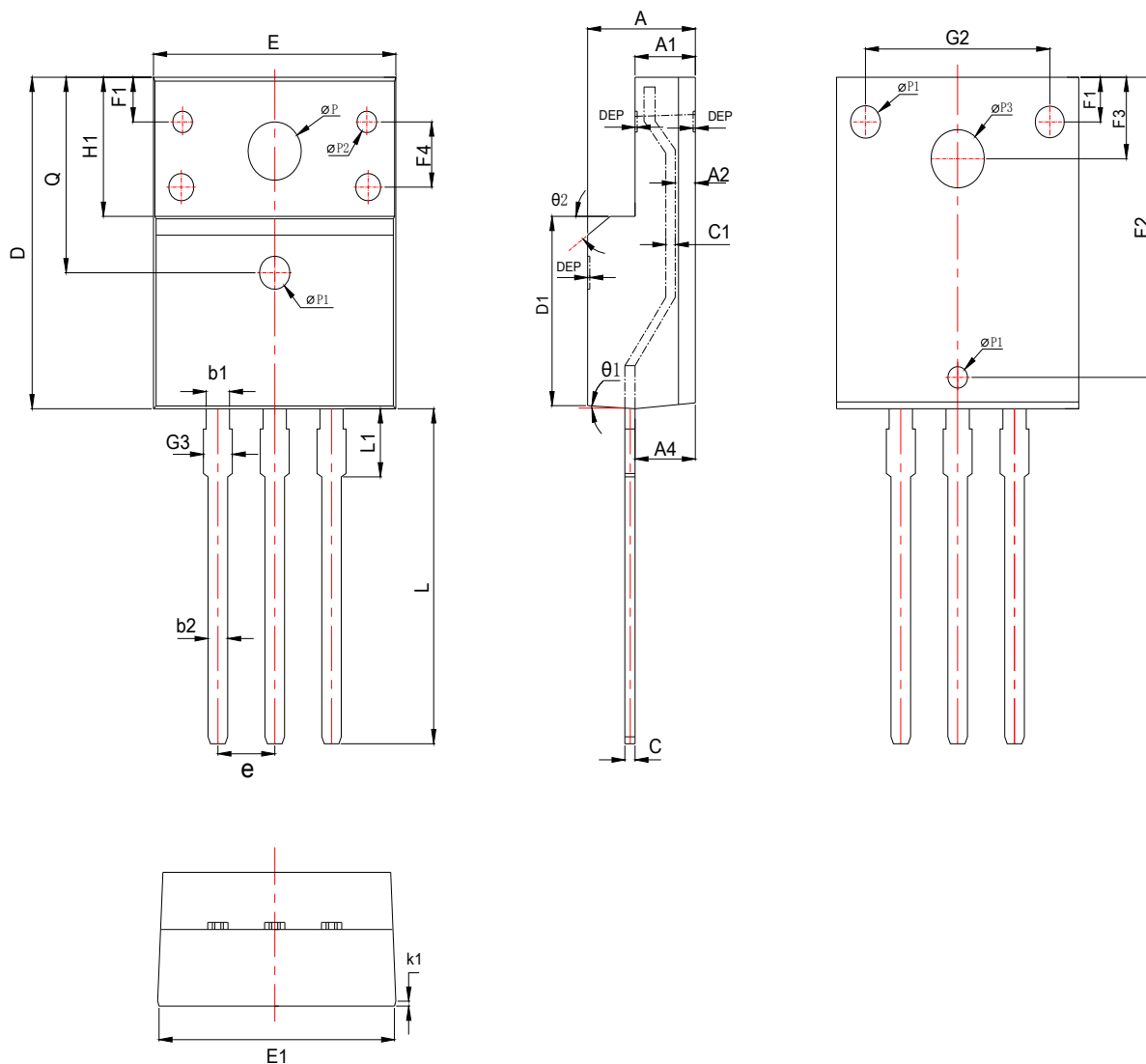


Switching Time Test Circuit and Waveforms



Package Information

TO220F



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
E	9.96	10.16	10.36	0.392	0.400	0.408	$\Phi p2$	1.15	1.20	1.25	0.045	0.047	0.049
A	4.50	4.70	4.90	0.177	0.185	0.193	$\Phi p3$		3.450			0.136	
A1	2.34	2.54	2.74	0.092	0.100	0.108	$\theta 1$	5°	7°	9°	5°	7°	9°
A2	0.95	1.05	1.15	0.037	0.041	0.045	$\theta 2$		45°			45°	
A4	2.65	2.75	2.85	0.104	0.108	0.112	DEP	0.05	0.10	0.15	0.002	0.004	0.006
c		0.50			0.020		F1	1.90	2.00	2.10	0.075	0.079	0.083
c1		0.50			0.020		F2	13.61	13.81	14.01	0.536	0.544	0.552
D	15.67	15.87	16.07	0.617	0.625	0.633	F3	3.20	3.30	3.40	0.126	0.130	0.134
Q	8.80	9.00	9.20	0.346	0.354	0.362	F4	5.25	5.40	5.55	0.207	0.213	0.219
H1	6.48	6.68	6.88	0.255	0.263	0.271	G2	6.90	7.00	7.10	0.272	0.276	0.280
e		2.54BSC			0.100BSC		G3	1.10	1.30	1.50	0.043	0.051	0.059
Φp		3.183			0.125		b1	1.17	1.21	1.24	0.046	0.047	0.049
L	12.78	12.98	13.18	0.503	0.511	0.519	b2	0.77	0.80	0.85	0.030	0.032	0.033
L1	3.25	3.45	3.65	0.128	0.136	0.144	E1	9.80	10.00	10.20	0.386	0.394	0.402
D1	8.99	9.19	9.39	0.354	0.362	0.370	K1	0.65	0.70	0.75	0.026	0.028	0.030
$\Phi p1$	1.40	1.50	1.60	0.055	0.059	0.063							