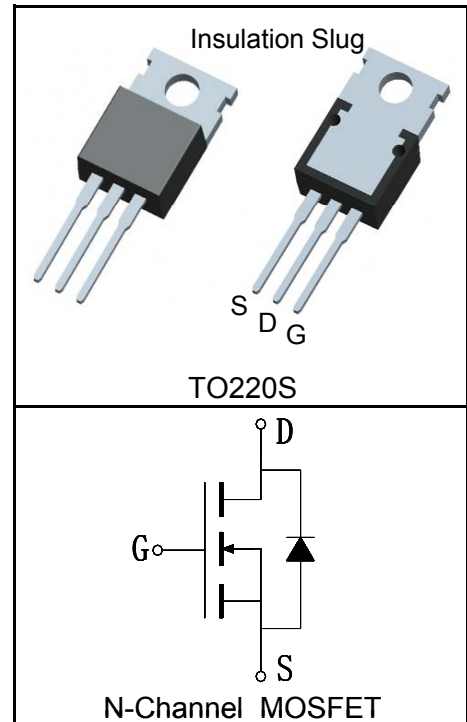


Features

- 150V/120A
 $R_{DS(ON)} = 11m\Omega(Typ.)@V_{GS}=10V$
- Insulation Slug ($V_{ISO} \geq 1500VAC$)
- Reliable and Rugged
- 100% avalanche tested
- 175°C Operating Temperature
- Lead Free and Green Devices Available (RoHS Compliant)

Pin Description



Applications

- High Efficiency Synchronous Rectification in SMPS
- High Speed Power Switching
- Automotive applications and a wide variety of other applications

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ C$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	150	V	
V_{GSS}	Gate-Source Voltage	± 25		
T_J	Maximum Junction Temperature	175	$^\circ C$	
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$	120	A
Mounted on Large Heat Sink				
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ C$	480	A
$I_D^{②}$	Continuous Drain Current ($V_{GS}=10V$)	$T_C=25^\circ C$	120	A
		$T_C=100^\circ C$	85	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	375	W
		$T_C=100^\circ C$	188	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.4	$^\circ C/W$	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	$^\circ C/W$	
Drain-Source Avalanche Ratings				
$E_{AS}^{③}$	Avalanche Energy, Single Pulsed	552	mJ	

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

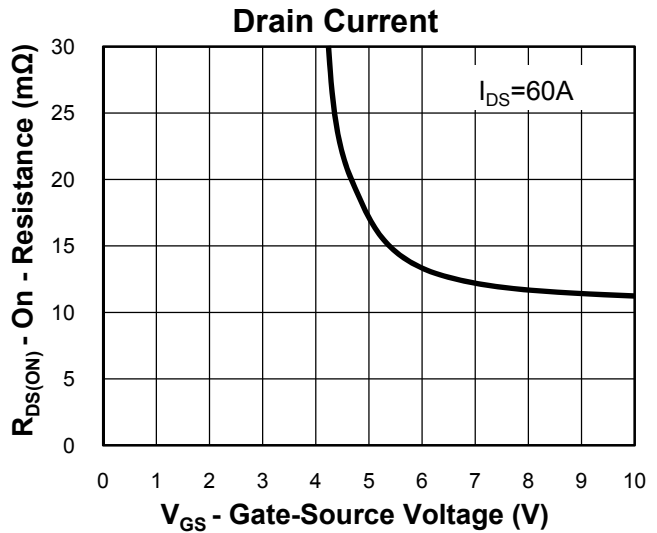
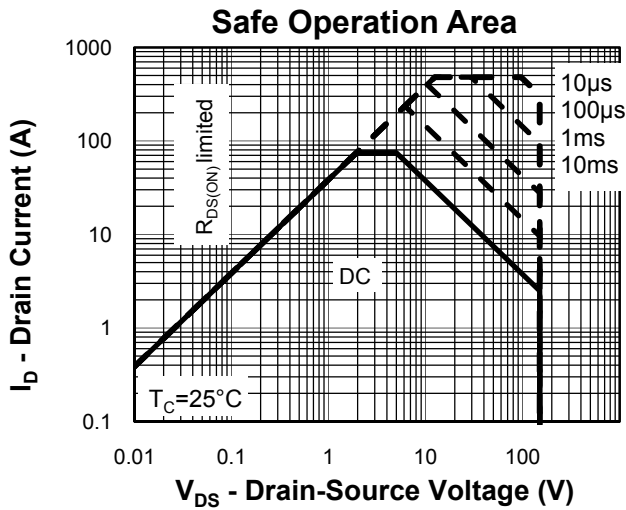
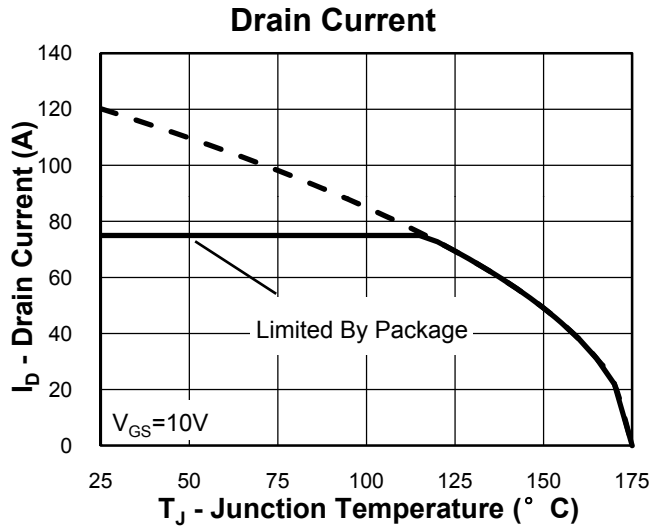
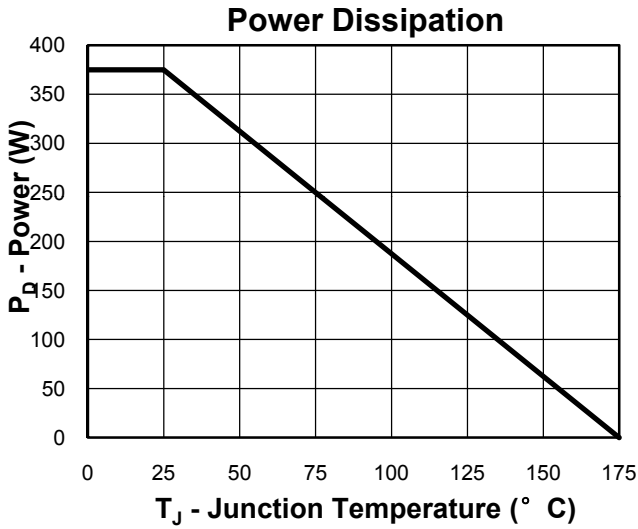
Symbol	Parameter	Test Condition	RU1Z120R3			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	150			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=150V, V_{GS}=0V$			1	μA
		$T_J=125^{\circ}\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2.5	3.3	4.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(4)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=60A$		11	15	m Ω
Diode Characteristics						
$V_{SD}^{(4)}$	Diode Forward Voltage	$I_{SD}=60A, V_{GS}=0V$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=60A, di_{SD}/dt=100A/\mu s$		56		ns
Q_{rr}	Reverse Recovery Charge			102		nC
Dynamic Characteristics ⁽⁵⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.5		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=75V,$ Frequency=1.0MHz		4900		pF
C_{oss}	Output Capacitance			1010		
C_{riss}	Reverse Transfer Capacitance			220		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=75V, I_{DS}=60A,$ $V_{GEN}=10V, R_G=6\Omega$		20		ns
t_r	Turn-on Rise Time			98		
$t_{d(OFF)}$	Turn-off Delay Time			105		
t_f	Turn-off Fall Time			52		
Gate Charge Characteristics ⁽⁵⁾						
Q_g	Total Gate Charge	$V_{DS}=120V, V_{GS}=10V,$ $I_{DS}=60A$		95		nC
Q_{gs}	Gate-Source Charge			25		
Q_{gd}	Gate-Drain Charge			30		

- Notes:
- ① Pulse width limited by safe operating area.
 - ② Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 75A.
 - ③ Limited by T_{Jmax} , $I_{AS}=47A$, $V_{DD}=48V$, $R_G=50\Omega$, 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.

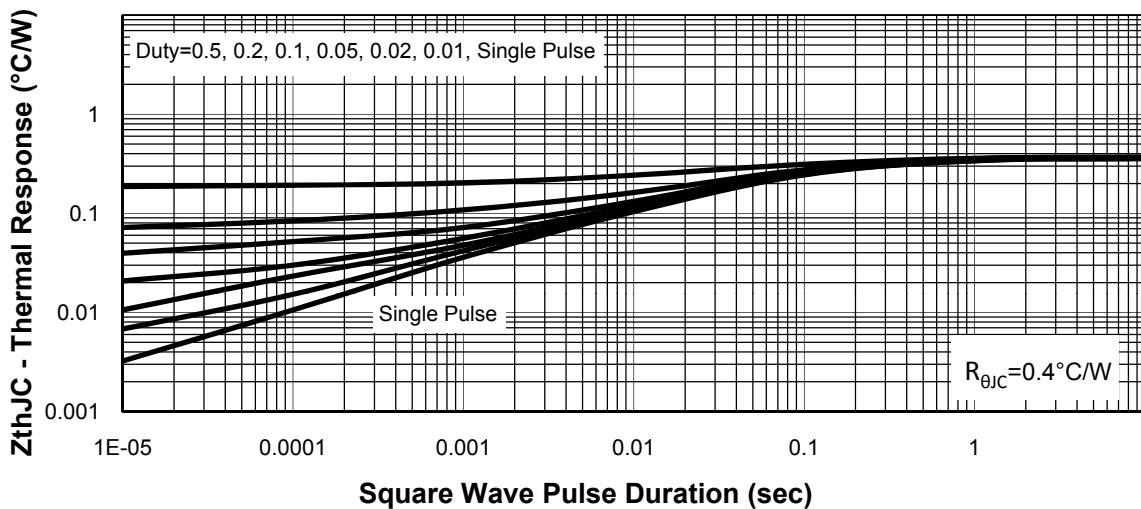
Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU1Z120R3	RU1Z120R3	TO220S	Tube	50	-	-

Typical Characteristics

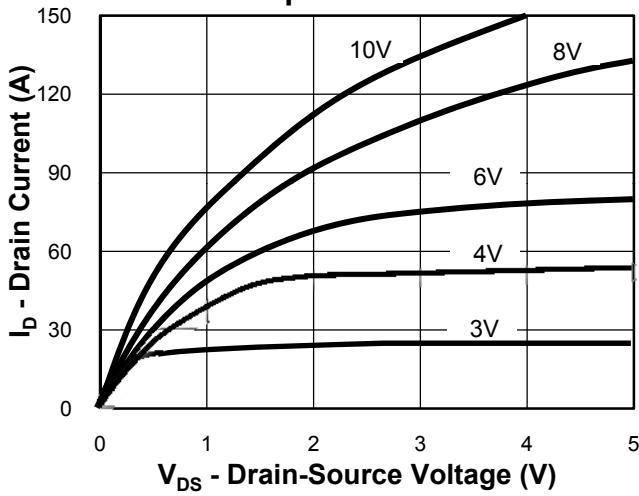


Thermal Transient Impedance

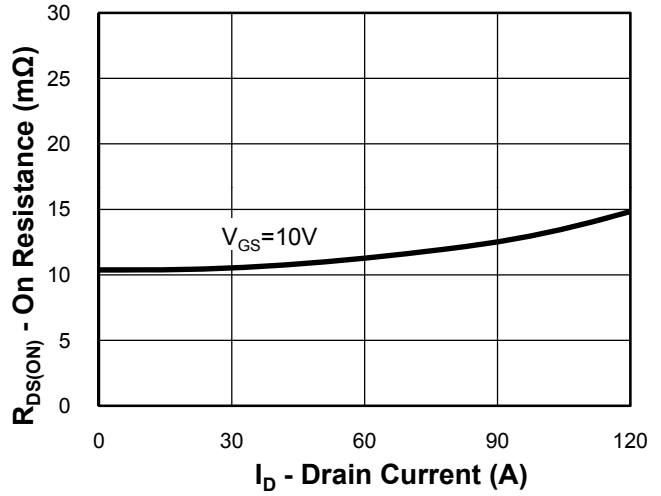


Typical Characteristics

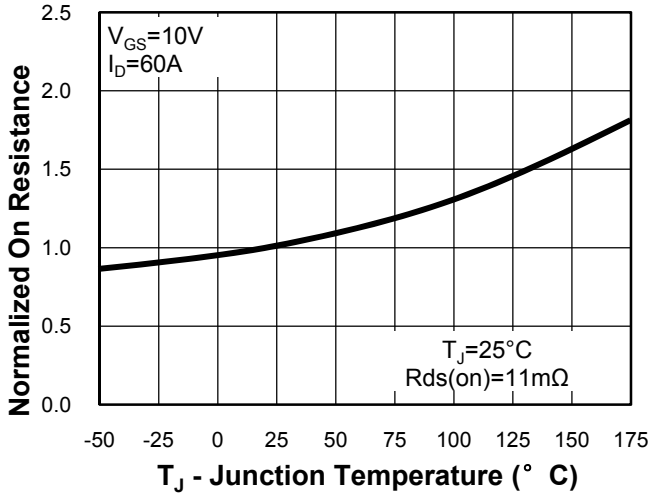
Output Characteristics



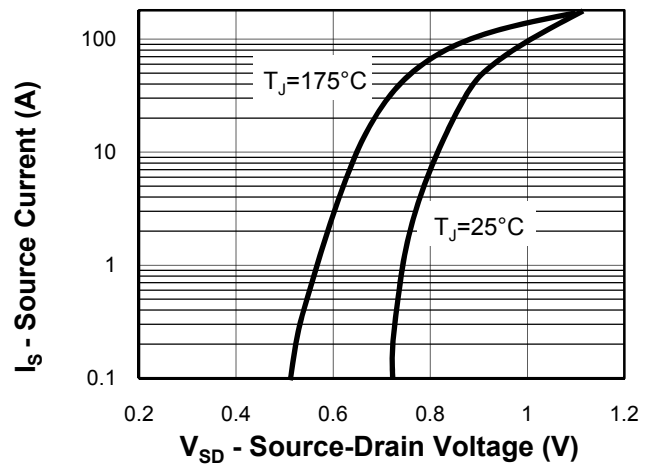
Drain-Source On Resistance



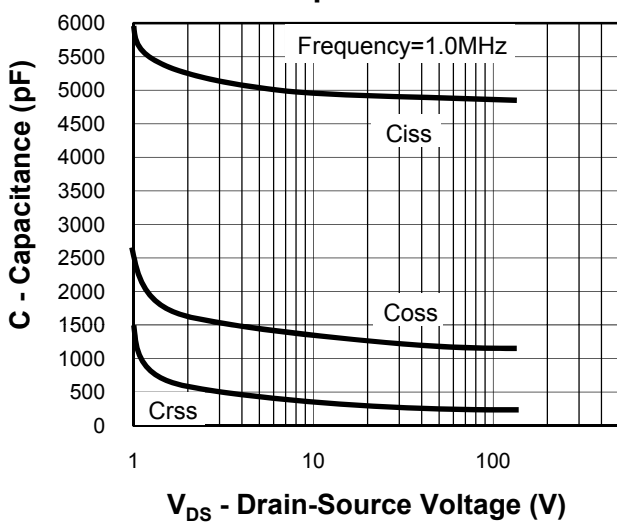
Drain-Source On Resistance



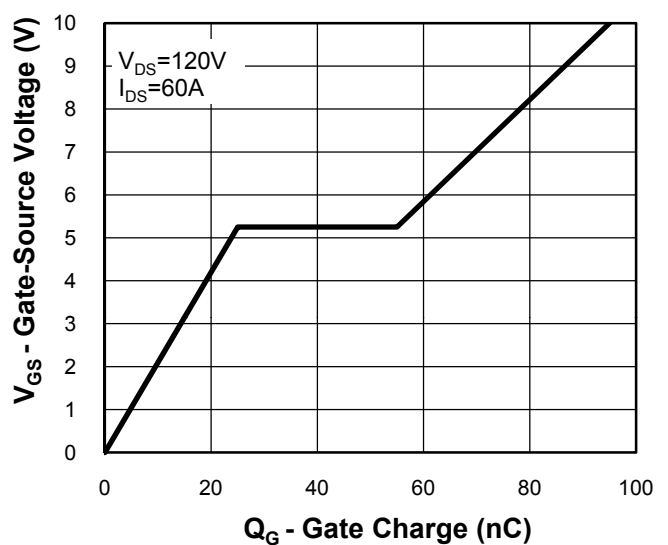
Source-Drain Diode Forward



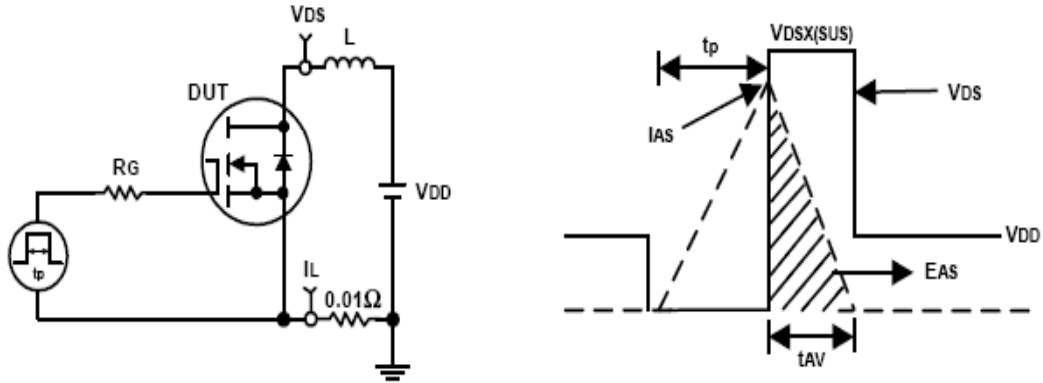
Capacitance



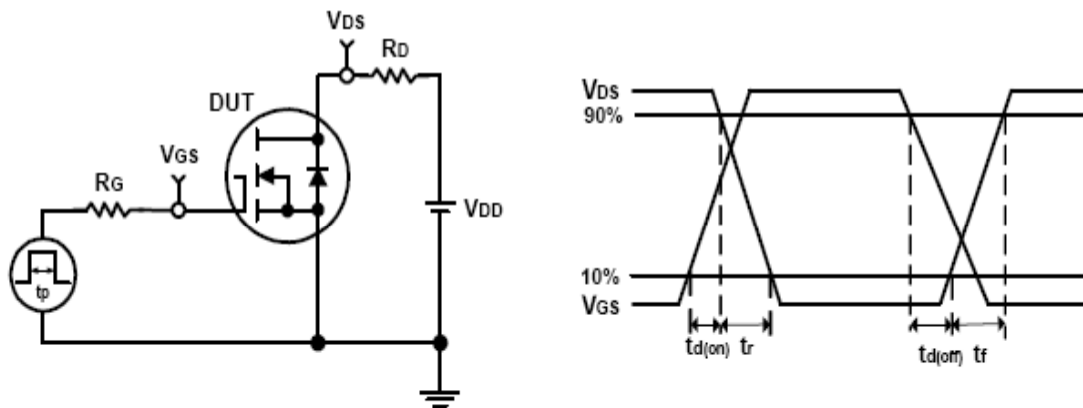
Gate Charge



Avalanche Test Circuit and Waveforms

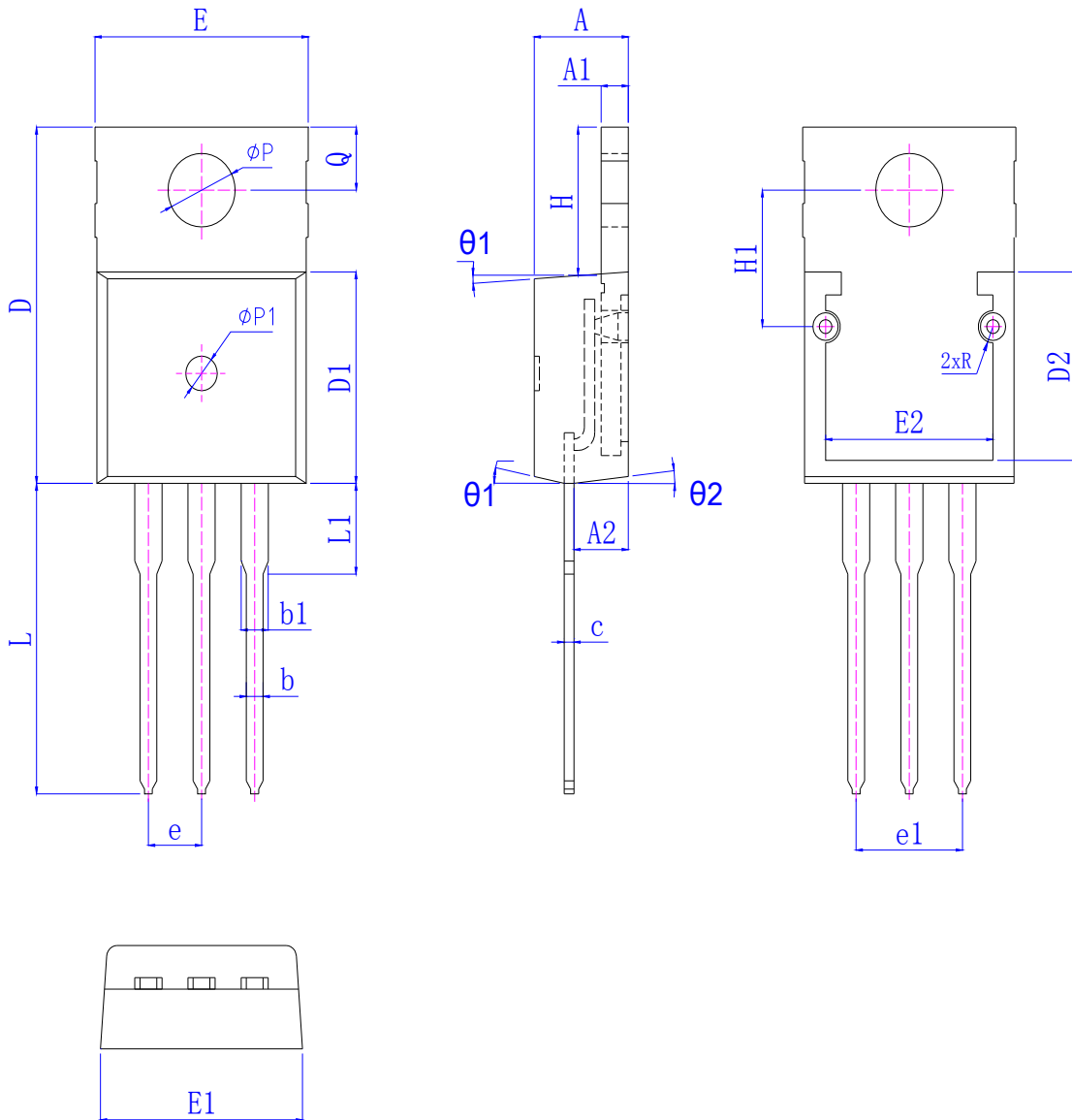


Switching Time Test Circuit and Waveforms



Package Information

TO220S



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.30	4.50	4.70	0.169	0.177	0.185	Φp	3.20	*	3.30	0.126	*	0.130
A1	1.25	1.27	1.29	0.049	0.050	0.051	e	2.54 BSC			0.10 BSC		
A2	2.37	2.57	2.77	0.093	0.101	0.109	e1	5.08 BSC			0.20 BSC		
b	0.60	0.80	1.00	0.024	0.031	0.039	H	6.13	6.23	6.43	0.241	0.245	0.253
b1	1.24	1.34	1.44	0.049	0.053	0.057	H1	5.89	5.94	5.99	0.232	0.234	0.236
c	0.40	0.50	0.60	0.016	0.020	0.024	L	12.90	13.40	13.90	0.508	0.528	0.547
D	15.33	15.53	15.73	0.604	0.611	0.619	L1	*	*	3.92	*	*	0.154
D1	9.10	9.30	9.50	0.358	0.366	0.374	$\Phi p1$	1.40	1.50	1.60	0.055	0.059	0.063
D2	8.14	8.19	8.24	0.320	0.322	0.324	Q	*	2.74	*	*	0.108	*
E	10.00	10.10	10.20	0.394	0.398	0.402	R	0.675	0.700	0.725	0.027	0.028	0.029
E1	9.96	10.16	10.36	0.392	0.400	0.408	$\theta 1$	1°	3°	5°	1°	3°	5°
E2	8.13	8.18	8.23	0.320	0.322	0.324	$\theta 2$	1°	3°	5°	1°	3°	5°

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