

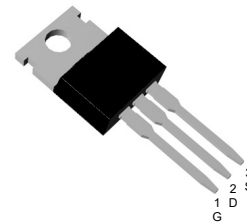
Features

- 40V/130A
 $R_{DS(ON)} = 2.5\text{m}\Omega(\text{typ.}) @ V_{GS} = 10\text{V}$
 $R_{DS(ON)} = 3\text{m}\Omega(\text{typ.}) @ V_{GS} = 4.5\text{V}$
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available
(RoHS Compliant)

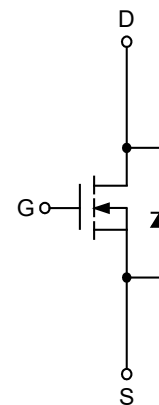
Applications

- SMPS Synchronous Rectification.
- Load Switch.
- DC-DC Conversion.
- Or-ing.

Pin Description



TO-220



N-Channel MOSFET

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		40	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		175	°C
T _{STG}	Storage Temperature Range		-55 to 175	
I _S ^a	Diode Continuous Forward Current	T _C =25°C	130	A
I _D ^a	Continuous Drain Current	T _C =25°C	130	
	Continuous Drain Current	T _C =100°C	98	
I _{DM} ^b	Pulsed Drain Current	T _C =25°C	390	
P _D	Maximum Power Dissipation	T _C =25°C	176	W
		T _C =100°C	88	
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	0.85	°C/W
R _{θJA} ^c	Thermal Resistance-Junction to Ambient	t ≤ 10s	15	°C/W
		Steady State	62.5	
I _{AS} ^d	Avalanche Current, Single pulse	L=0.5mH	32	A
E _{AS} ^d	Avalanche Energy, Single pulse	L=0.5mH	256	mJ

Note a : Maximum continuous current is limited by bonding wire.

Note b : Pulse width limited by maximum junction temperature 175°C .

Note c : $R_{\theta\text{JA}}$ steady state $t=999\text{s}$.

Note d : UIS tested and pulse width limited by maximum junction temperature 175°C (initial temperature $T_J=25^{\circ}\text{C}$).

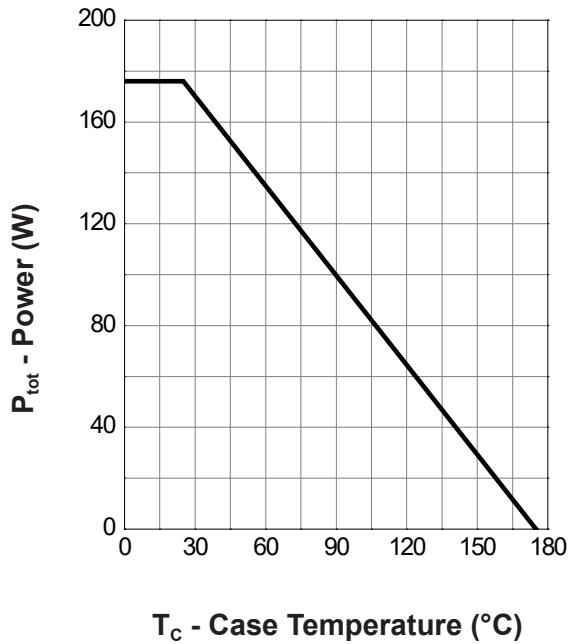
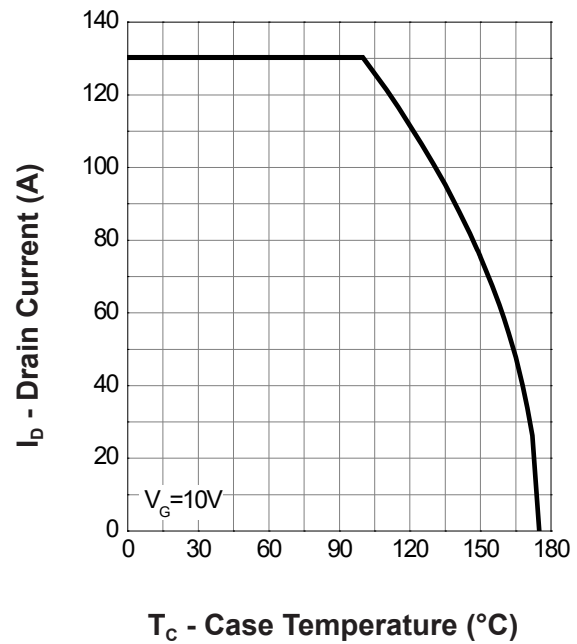
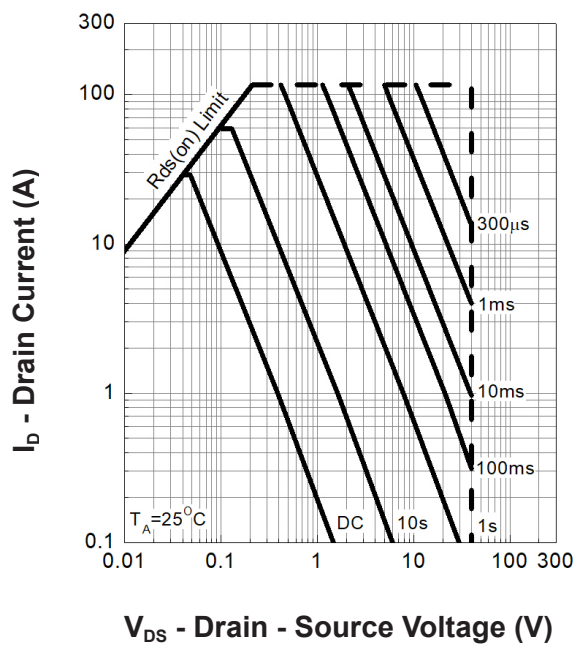
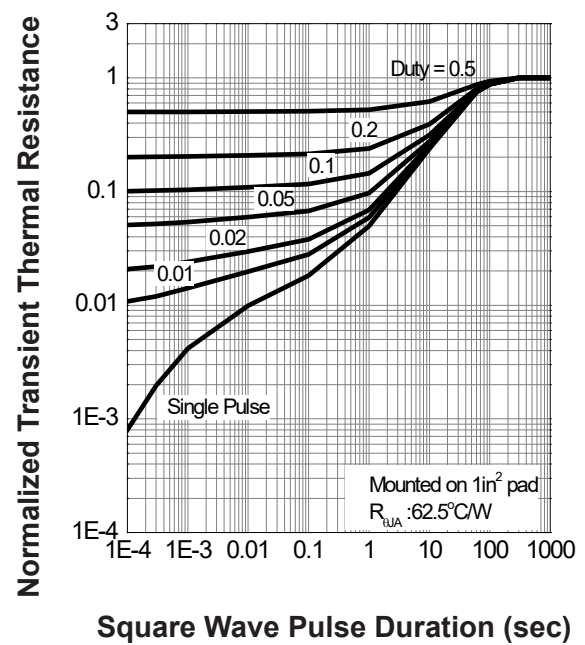
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V T _J =85°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.5	2.3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^c	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =25A V _{GS} =4.5V, I _{DS} =20A	-	2.5 3	3 4.2	mΩ
Gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =20A	-	3.5	-	S
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V	-	0.78	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =25A, dI _{SD} /dt=100A/μs V _{dd} =20V	-	61	-	ns
t _a	Charge Time		-	31	-	
t _b	Discharge Time		-	30	-	
Q _{rr}	Reverse Recovery Charge		-	67	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	0.9	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Frequency=1.0MHz	-	6230	-	pF
C _{oss}	Output Capacitance		-	600	-	
C _{rss}	Reverse Transfer Capacitance		-	575	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =20V, R _L =20Ω, I _{DS} =1A, V _{GEN} =10V, R _G =1Ω	-	18.8	-	ns
t _r	Turn-on Rise Time		-	9.8	-	
t _{d(OFF)}	Turn-off Delay Time		-	50	-	
t _f	Turn-off Fall Time		-	90.8	-	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _{DS} =25A	-	89	-	nC
Q _{gth}	Threshold Gate Charge		-	16	-	
Q _{gs}	Gate-Source Charge		-	25	-	
Q _{gd}	Gate-Drain Charge		-	16	-	

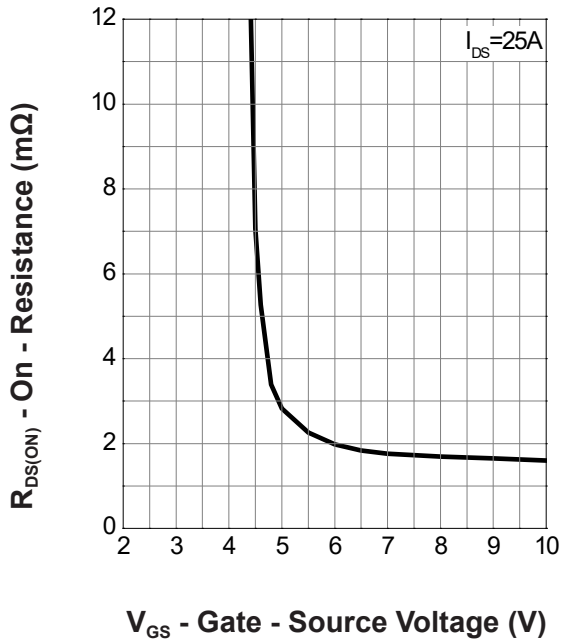
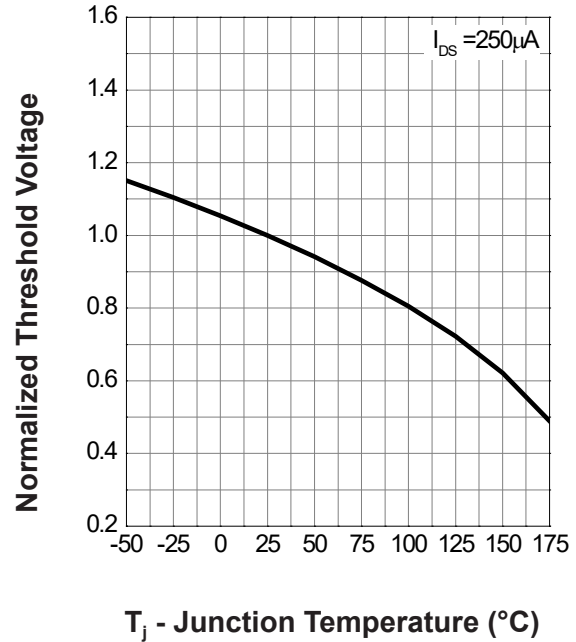
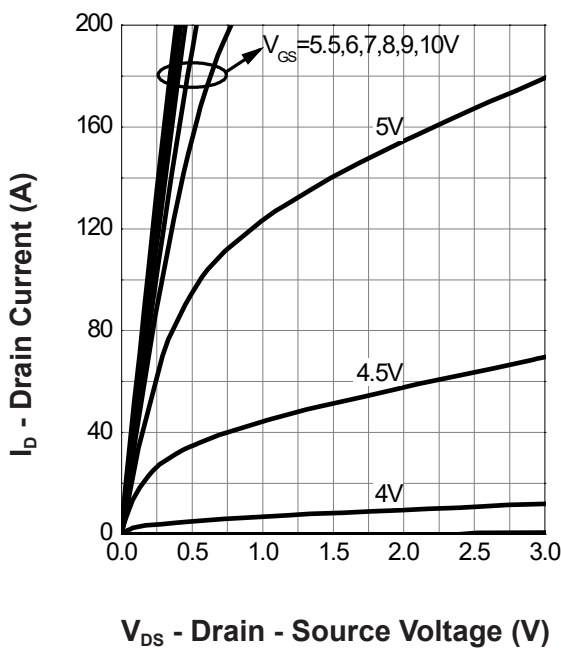
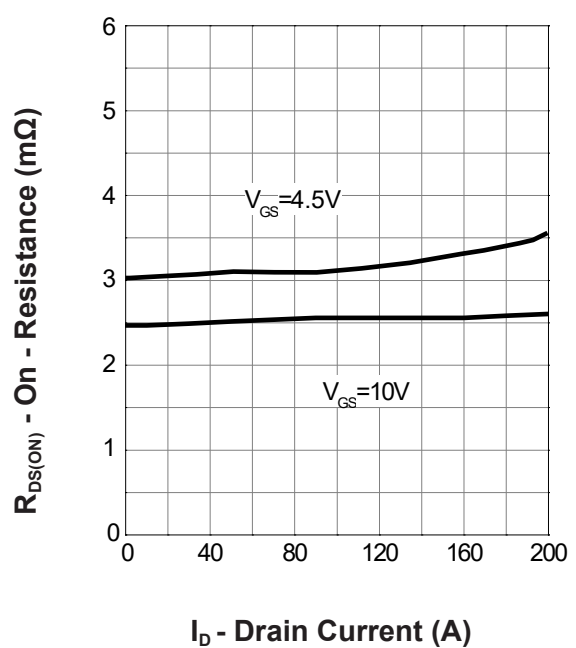
Note e : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Note f : Guaranteed by design, not subject to production testing.

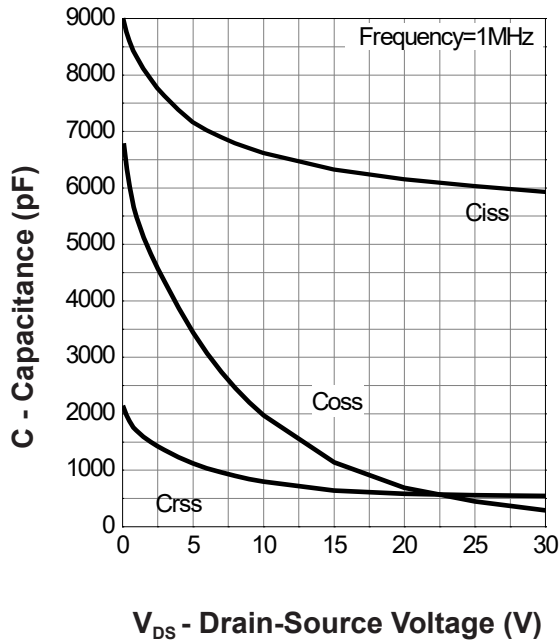
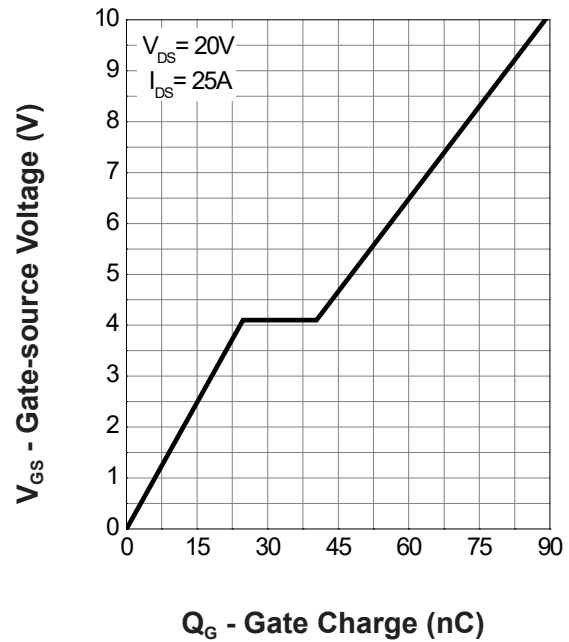
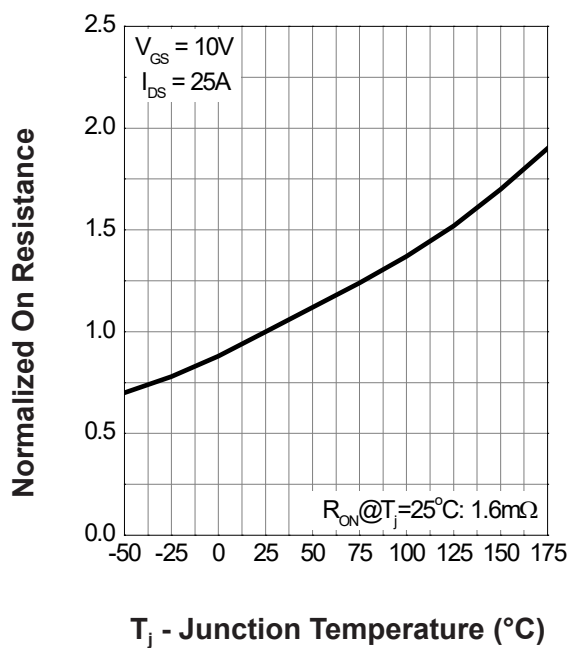
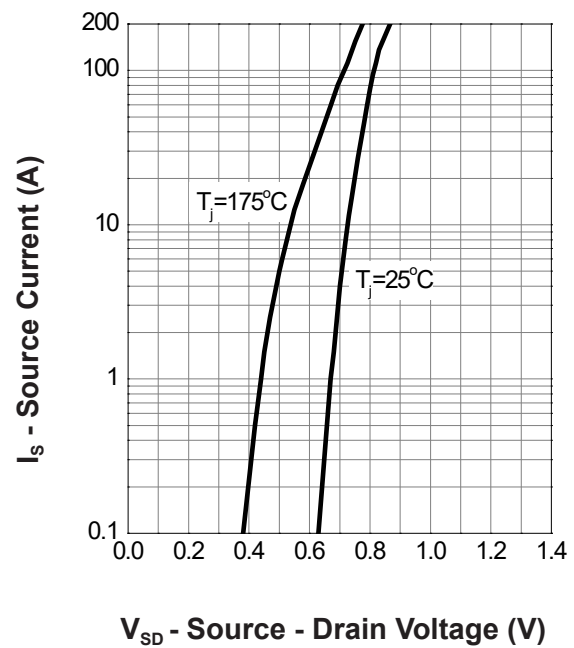
Typical Operating Characteristics

Power Dissipation

Drain Current

Safe Operation Area

Thermal Transient Impedance


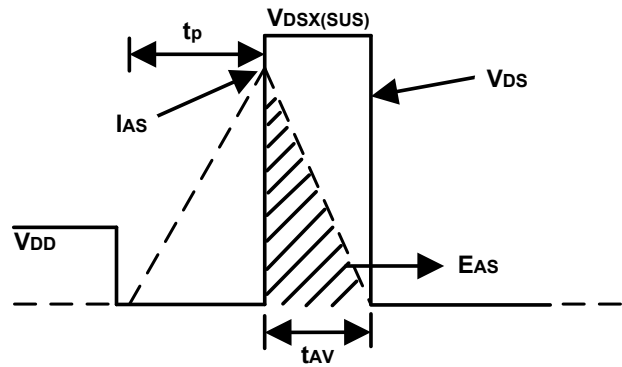
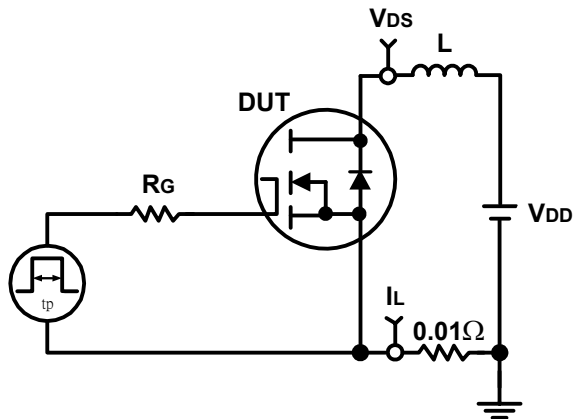
Typical Operating Characteristics(Cont.)

Gate-Source On Resistance

Gate Threshold Voltage

Output Characteristics

Drain-Source On Resistance


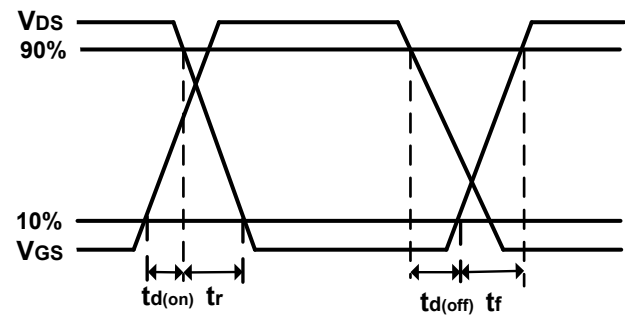
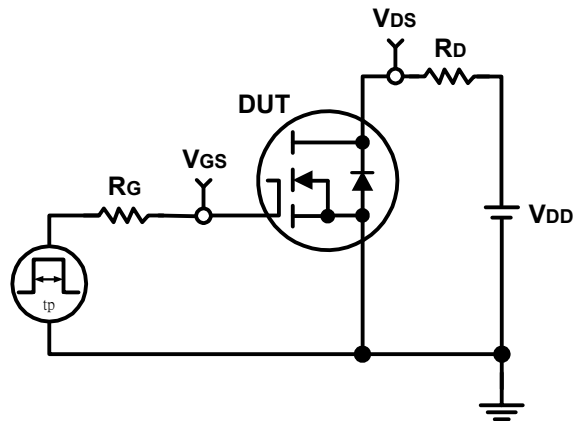
Typical Operating Characteristics(Cont.)

Capacitance

Gate Charge

Drain-Source On Resistance

Source-Drain Diode Forward


Avalanche Test Circuit and Waveforms

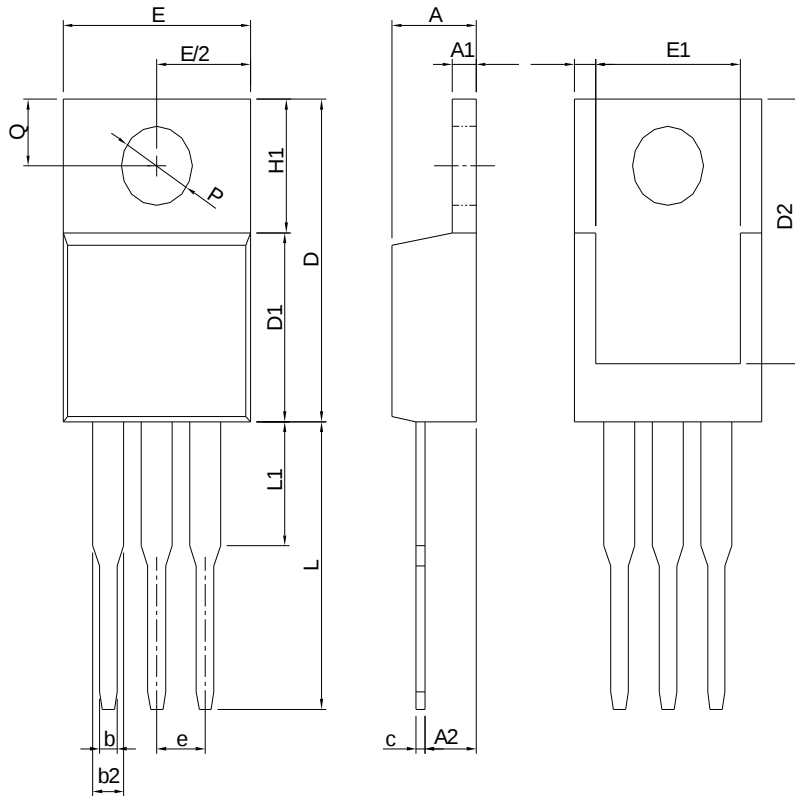


Switching Time Test Circuit and Waveforms



Package Information

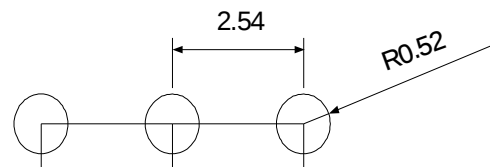
TO-220



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.30	0.330	0.366
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

Note: Follow JEDEC TO-220 AB.

RECOMMENDED LAND PATTERN



UNIT: mm