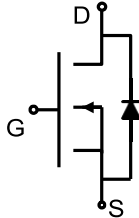



<p><b>Description</b></p> <p>The GC11N70 uses advanced super junction technology and design to provide excellent <math>R_{DS(ON)}</math> and low gate charge. This device is suitable for industry AC-DC SMPS requirement of PFC, AC/DC power conversion, and other industrial power application.</p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● New technology for high voltage device</li> <li>● Low on-resistance and low conduction losses</li> <li>● Small Package</li> <li>● Ultra Low Gate Charge cause lower driving requirement</li> <li>● 100% Avalanche Tested</li> <li>● RoHS Compliant</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● Power Factor Correction (PFC)</li> <li>● Switched Mode Power Supply (SMPS)</li> <li>● Uninterruptible Power Supply (UPS)</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <td style="text-align: center;">V<sub>DS</sub></td> <td style="text-align: center;">R<sub>DS(ON)</sub> @ 10V (max)</td> <td style="text-align: center;">I<sub>D</sub></td> </tr> <tr> <td style="text-align: center;">700V</td> <td style="text-align: center;">395mΩ</td> <td style="text-align: center;">11A</td> </tr> </table> <div style="text-align: center;">  <p><b>Schematic Diagram</b></p> </div> <div style="text-align: center;">  <p><b>Marking and Pin Assignment</b></p> </div>	V <sub>DS</sub>	R <sub>DS(ON)</sub> @ 10V (max)	I <sub>D</sub>	700V	395mΩ	11A
V <sub>DS</sub>	R <sub>DS(ON)</sub> @ 10V (max)	I <sub>D</sub>					
700V	395mΩ	11A					

■ **Ordering Information**

Part Number	Marking	Case	Packaging
GC11N70K	GC11N70	TO-252	25000pcs/Reel
GC11N70T	GC11N70	TO-220	50pcs/Tube
GC11N70F	GC11N70	TO-220F	50pcs/Tube

**Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Value		Unit
		TO-252 TO-220	TO-220F	
Drain-Source Voltage	V <sub>DS</sub>	700		V
Gate-Source Voltage	V <sub>GS</sub>	±30		V
Drain Current-Continuous (T <sub>C</sub> =25°C)	I <sub>D</sub>	11		A
Drain Current-Continuous (T <sub>C</sub> =100°C)	I <sub>D</sub>	6.6		A
Drain Current-Pulsed (Note 1)	I <sub>DM</sub>	33		A
Single Pulse Avalanche Energy (Note 2)	E <sub>AS</sub>	215		mJ
Repetitive Avalanche Energy (Note 1)	E <sub>AR</sub>	0.32		mJ
Avalanche Current (Note 1)	I <sub>AR</sub>	1.8		A
Maximum Power Dissipation (T <sub>C</sub> =25°C)	P <sub>D</sub>	83	31	W
MOSFET dv/dt ruggedness, V <sub>DS</sub> = 0...480V	dv/dt	50		V/ns
Reverse diode dv/dt, V <sub>DS</sub> = 0...480V, I <sub>SD</sub> ≤ I <sub>D</sub>	dv/dt	15		V/μs
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 To 150		°C

## Thermal Characteristic

Parameter	Symbol	Value		Unit
		TO-252 TO-220	TO-220F	
Thermal Resistance,Junction-to-Case	$R_{thJC}$	1.5	4	°C/W
Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{thJA}$	62	80	°C/W

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>On/ Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	700	-	-	V
Zero Gate Voltage Drain Current ( $T_C=25^\circ\text{C}$ )	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$	-	-	1	$\mu A$
Zero Gate Voltage Drain Current ( $T_C=125^\circ\text{C}$ )	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$	-	-	100	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	-	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5.5A$	-	-	395	m $\Omega$
Gate resistance	$R_G$	$f = 1.0\text{MHz}$ open drain	-	18	-	$\Omega$
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=100V, V_{GS}=0$ $V, F=1.0\text{MHz}$	-	871	-	PF
Output Capacitance	$C_{oss}$		-	37	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	5	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=400V, I_D=11A$ $V_{GS}=10V, R_{GEN}=25\Omega$	-	70	-	ns
Turn-on Rise Time	$t_r$		-	70	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	145	-	ns
Turn-Off Fall Time	$t_f$		-	59	-	ns
Total Gate Charge	$Q_g$	$V_{DD}=520V, I_D=11A, V_{GS}=10V$	-	22	-	nC
Gate-Source Charge	$Q_{gs}$		-	4	-	nC
Gate-Drain Charge	$Q_{gd}$		-	8	-	nC
<b>Drain-Source Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C=25^\circ\text{C}$	-	-	11	A
Pulsed Diode Forward Current	$I_{SM}$	$T_C=25^\circ\text{C}$	-	-	33	A
Diode Forward Voltage	$V_{SD}$	$T_J=25^\circ\text{C},$ $I_{SD}=11A, V_{GS}=0V$	-	-	1.2	V
Reverse Recovery Time	$t_{rr}$	$V_R=400V, I_F=I_S,$ $di_F/dt = 100A/\mu s$	-	377	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	3.4	-	$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$		-	17.8	-	A

## Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2.  $I_{AS} = 1.8A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse Width  $\leq 300\mu s, \text{Duty Cycle } \leq 1\%.$
4. Guaranteed by design, not subject to production

Typical Electrical And Thermal Characteristics

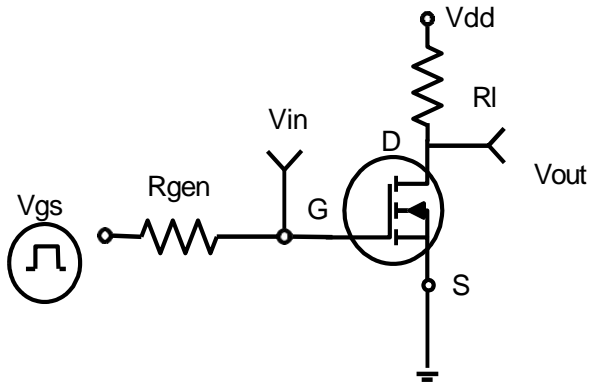


Figure 1. Switching Test Circuit

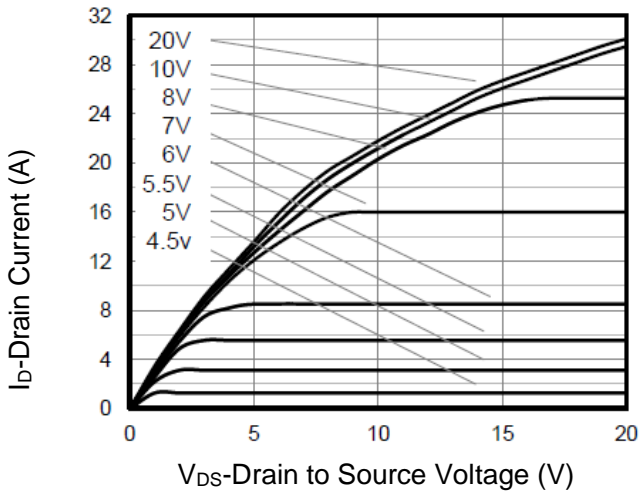


Figure 3. Output Characteristics

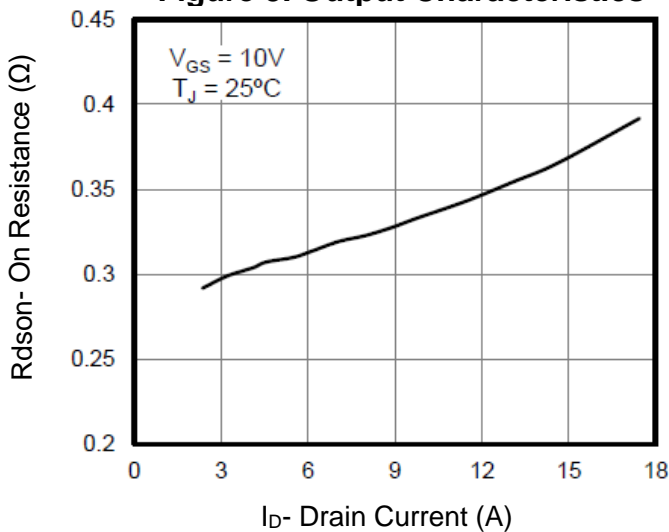


Figure 5. On Resistance vs. Drain Current

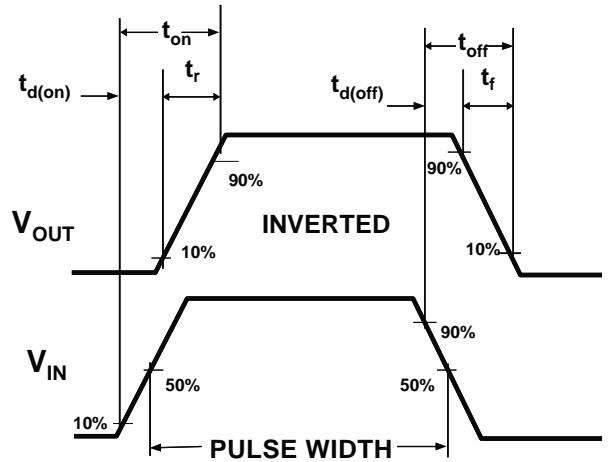


Figure 2. Switching Waveforms

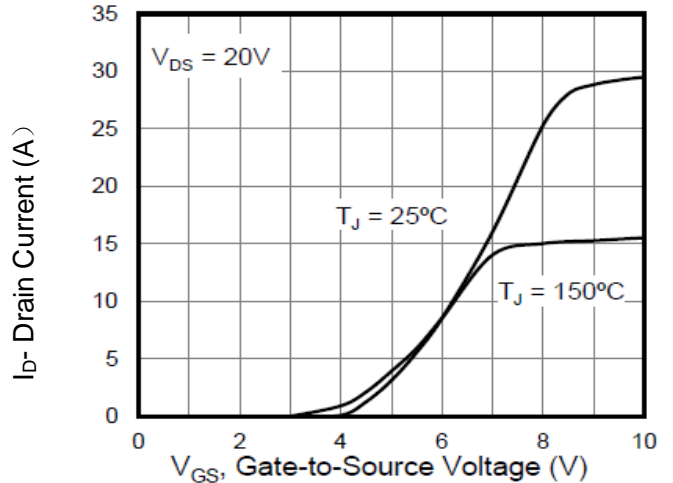


Figure 4. Transfer Characteristics

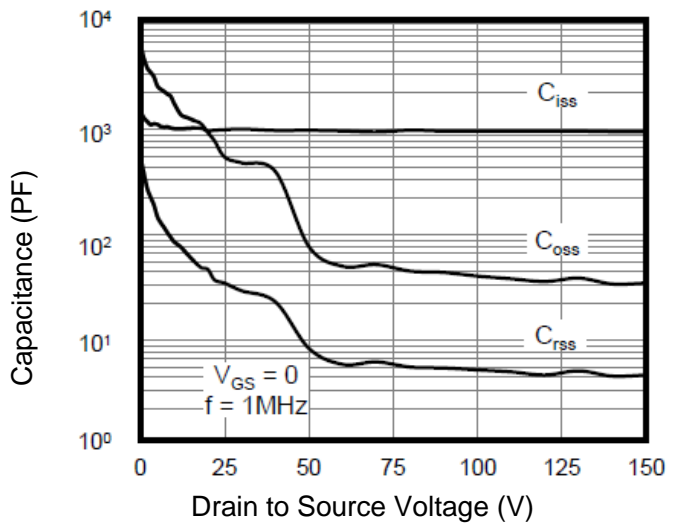


Figure 6. Capacitance

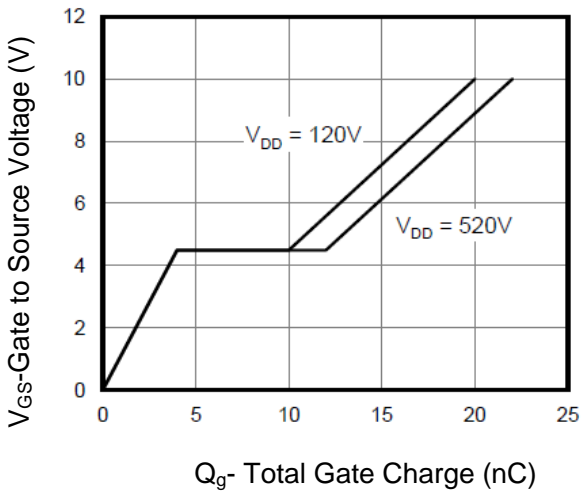


Figure 7. Gate Charge

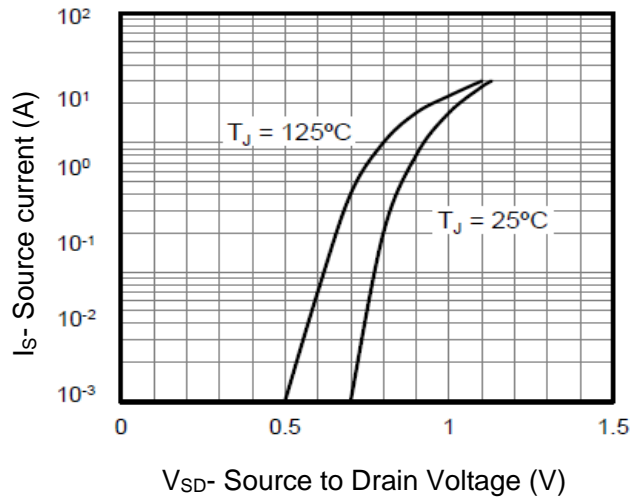


Figure 8. Body Diode Forward Voltage

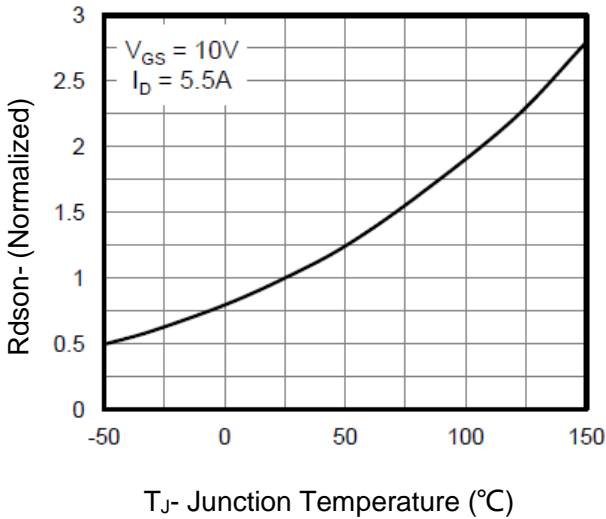


Figure 9. On- Resistance vs. Junction Temperature

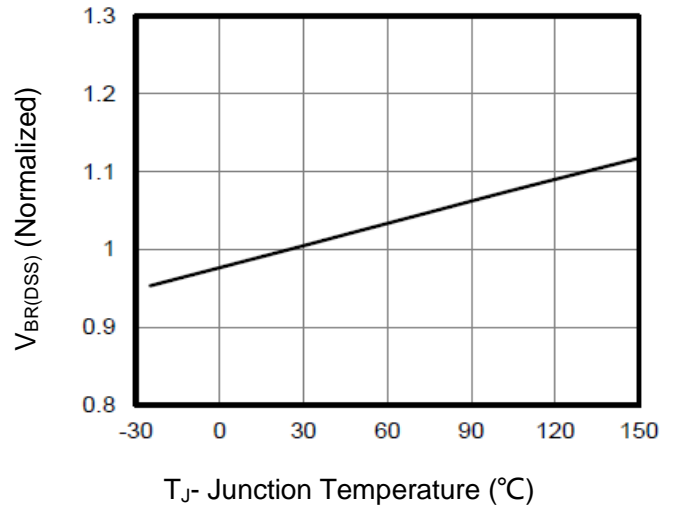


Figure 10. Breakdown Voltage vs. Junction Temperature

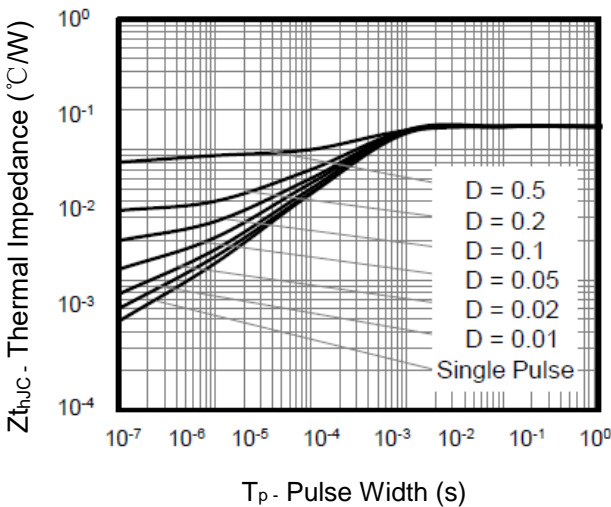


Figure 11. Transient Thermal Impedance (TO-252/TO-220)

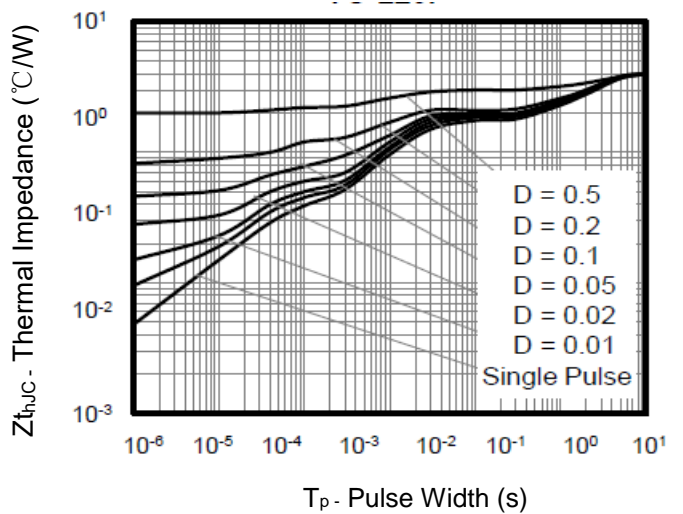
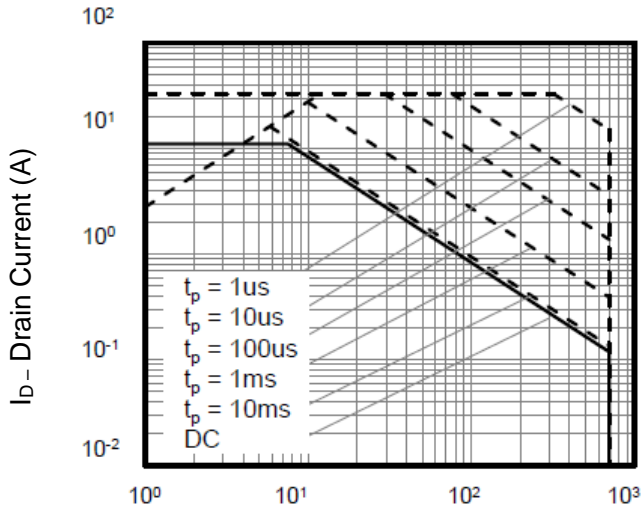
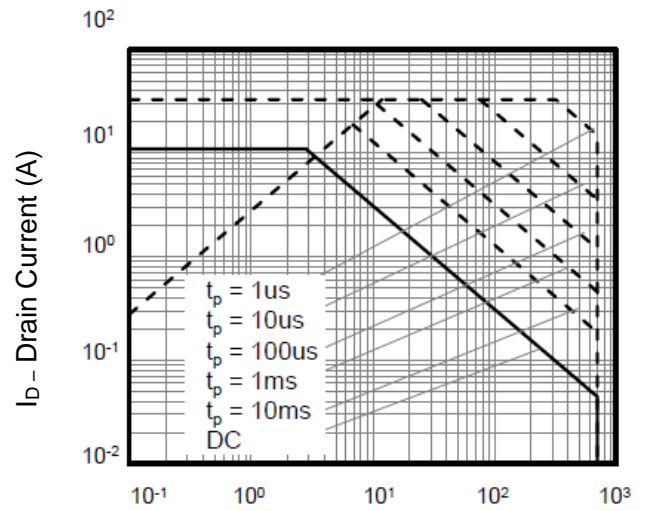


Figure 12. Transient Thermal Impedance (TO-220F)



$V_{DS}$  - Drain to Source voltage (V)

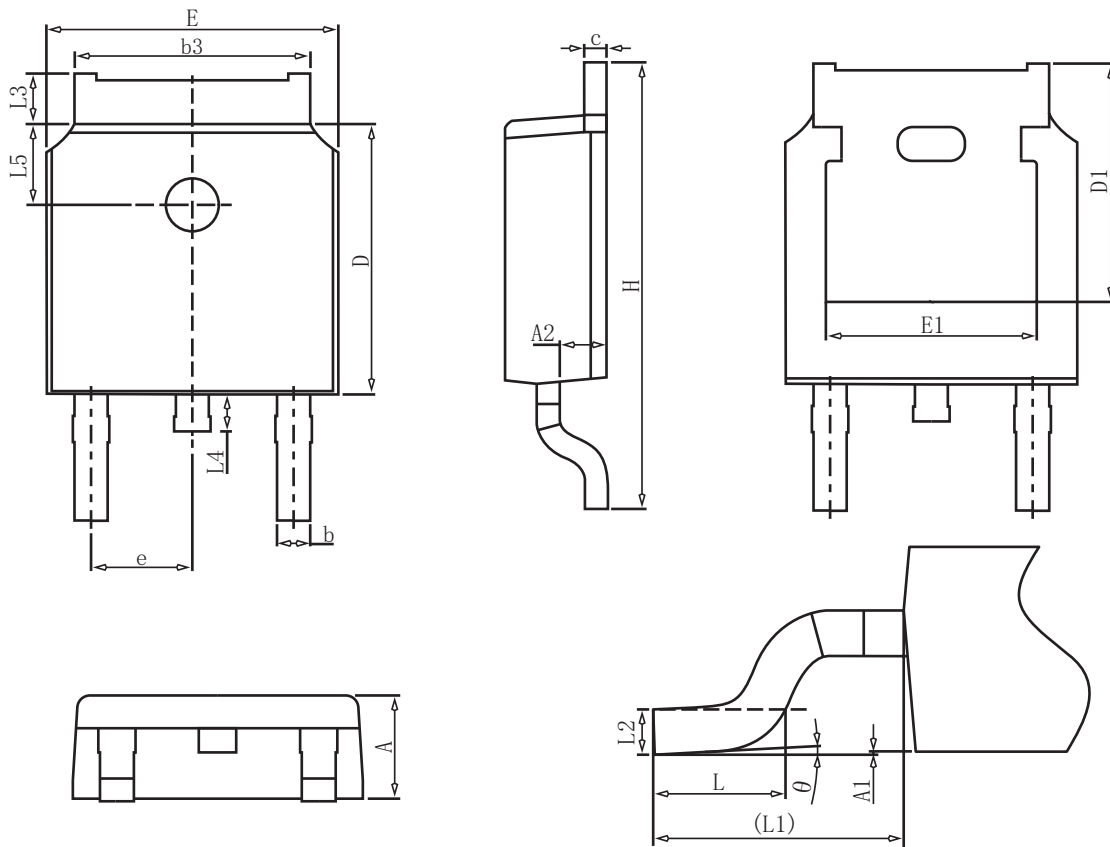
**Figure 13. Safe Operation Area for TO-252/TO-220**



$V_{DS}$  - Drain to Source Voltage (V)

**Figure 14. Safe Operation Area for TO-220F**

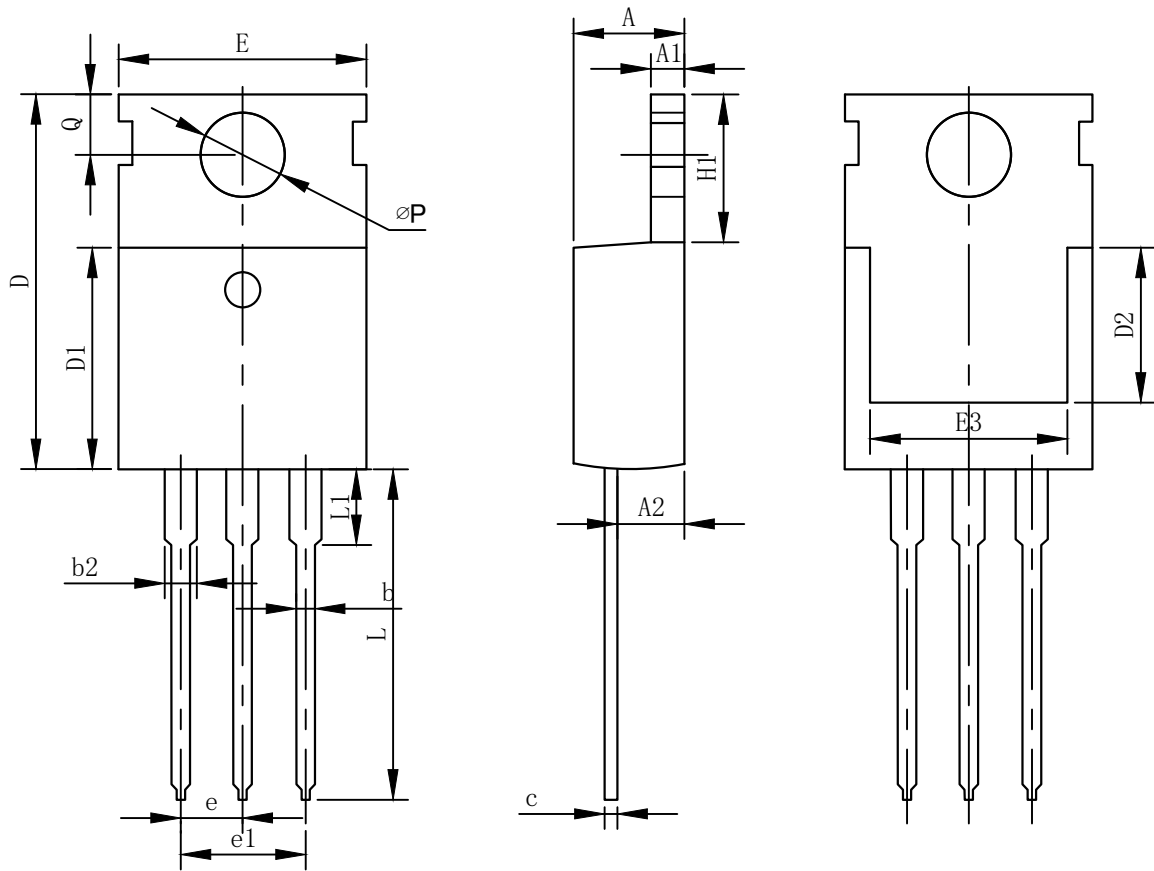
TO-252 Package information



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°

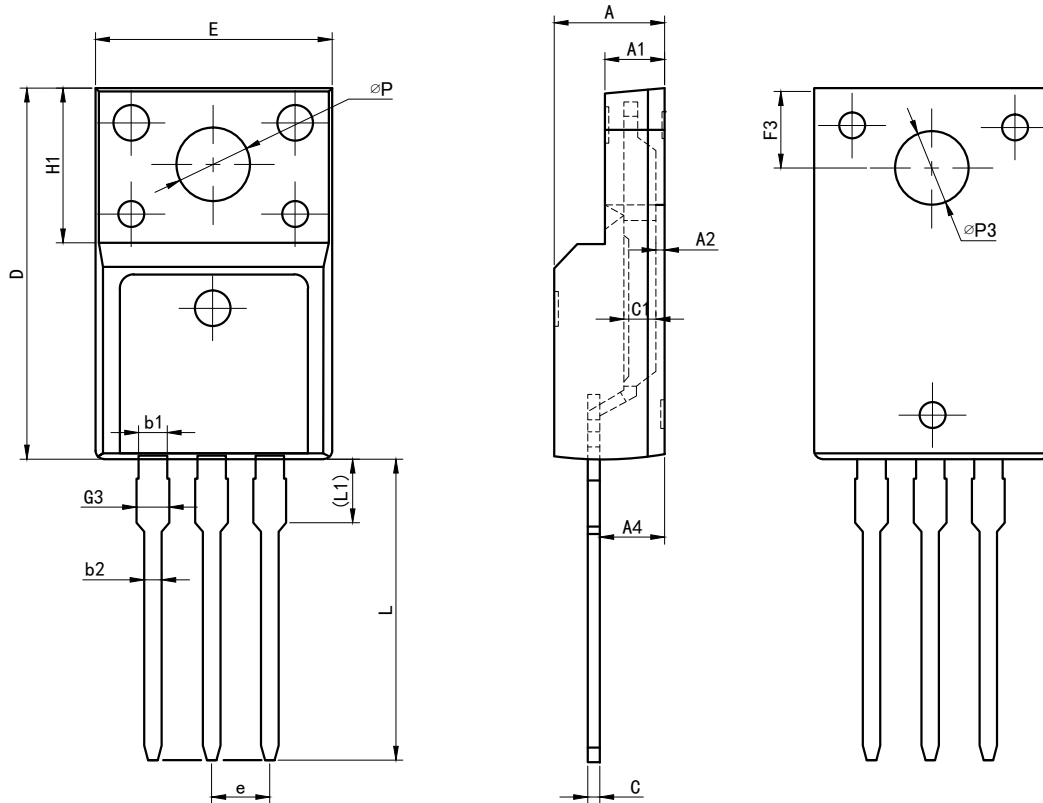
TO-220 Package information



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.70	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54BSC		
e1	5.08BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
øP	3.40	3.60	3.80
Q	2.60	2.80	3.00

## TO-220F Package information



### COMMON DIMENSIONS

SYMBOL	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
$\varnothing P$	3.03	3.18	3.38
$\varnothing P3$	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