

**General Description**

GT125N10 use advanced SFGMOS™ technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable to use in motor control applications.

**Features**

- ◆ Low  $R_{DS(on)}$  & FOM
- ◆ Extremely low switching loss
- ◆ Excellent stability and uniformity
- ◆ Fast switching and soft recovery
- ◆ RoHS Compliant

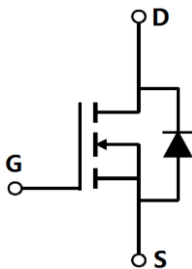
$V_{DSS}$	$R_{DS(ON)}$ @10V(Typ.)	$I_D$
100V	4.1mΩ	130A

**Applications**

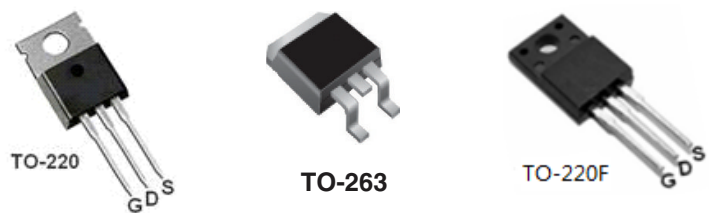
- ◆ Consumer electronic power supply
- ◆ Motor control
- ◆ Synchronous-rectification
- ◆ Isolated DC/DC convertor
- ◆ Invertors

**Schematic and Package Information**

**SCHEMATIC DIAGRAM**



**PIN ASSIGNMENT TOP VIEW**



**Ordering Information**

Part Number	Marking	Case	Packaging
GT125N10T	GT125N10	TO-220	50pcs/Tube
GT125N10M	GT125N10	TO-263	800pcs/Reel
GT125N10F	GT125N10	TO-220F	50pcs/Tube

## ■ Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	$V_{DS}$	100	V
Gate source voltage	$V_{GS}$	$\pm 20$	V
Continuous drain current <sup>1)</sup> , $T_C=25^\circ\text{C}$	$I_D$	130	A
Pulsed drain current <sup>2)</sup> , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	390	A
Power dissipation <sup>3)</sup> for TO220, TO263 $T_C=25^\circ\text{C}$	$P_D$	192	W
Power dissipation <sup>3)</sup> for TO220F, $T_C=25^\circ\text{C}$		34	
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	400	mJ
Operation and storage temperature	$T_{stg}, T_j$	-55 to 150	$^\circ\text{C}$

## ■ Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO263/TO220	TO220F	
Thermal resistance, junction-case	$R_{\theta JC}$	0.65	3.68	$^\circ\text{C}/\text{W}$
Thermal resistance, junction-ambient <sup>4)</sup>	$R_{\theta JA}$	62	62.5	$^\circ\text{C}/\text{W}$

## ■ Electrical Characteristics at $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	$BV_{DSS}$	100			V	$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2.0		4.0	V	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		4.1	4.6	m $\Omega$	$V_{GS}=10\text{ V}, I_D=60\text{ A}$
Gate-source leakage current	$I_{GSS}$			100	nA	$V_{GS}=20\text{ V}$
				-100		$V_{GS}=-20\text{ V}$
Drain-source leakage current	$I_{DSS}$			1	$\mu\text{A}$	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V}$

## ■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	$C_{iss}$		6124.6		pF	$V_{GS}=0\text{ V},$ $V_{DS}=50\text{ V},$ $f=1\text{ MHz}$
Output capacitance	$C_{oss}$		792.3		pF	
Reverse transfer capacitance	$C_{rss}$		15.1		pF	
Turn-on delay time	$t_{d(on)}$		28.2		ns	$V_{GS}=10\text{ V},$ $V_{DS}=50\text{ V},$ $R_G=2.2\ \Omega,$ $I_D=22\text{ A}$
Rise time	$t_r$		7.5		ns	
Turn-off delay time	$t_{d(off)}$		81.9		ns	
Fall time	$t_f$		20.1		ns	

## ■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	$Q_g$		101.6		nC	$I_D=22\text{ A}$ , $V_{DS}=50\text{ V}$ , $V_{GS}=10\text{ V}$
Gate-source charge	$Q_{gs}$		20.6		nC	
Gate-drain charge	$Q_{gd}$		28.7		nC	
Gate plateau voltage	$V_{\text{plateau}}$		4.2		V	

## ■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward current	$I_S$			130	A	$V_{GS} < V_{th}$
Pulsed source current	$I_{SP}$			390		
Diode forward voltage	$V_{SD}$			1.3	V	$I_S=20\text{ A}$ , $V_{GS}=0\text{ V}$
Reverse recovery time	$t_{rr}$		82.1		ns	$I_S=10\text{ A}$ , $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	$Q_{rr}$		248.4		nC	
Peak reverse recovery current	$I_{rrm}$		4.9		A	

## ■ Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3)  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25\text{ }^\circ\text{C}$ .
- 5)  $V_{DD}=50\text{ V}$ ,  $R_G=25\text{ }\Omega$ ,  $L=0.5\text{ mH}$ , starting  $T_j=25\text{ }^\circ\text{C}$ .

■ Electrical Characteristics Diagrams

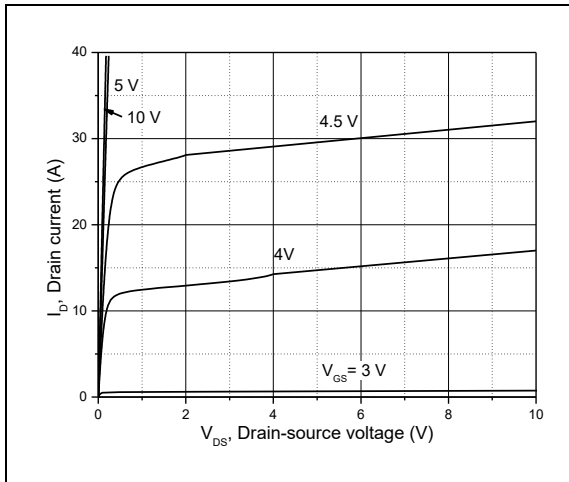


Figure 1, Typ. output characteristics

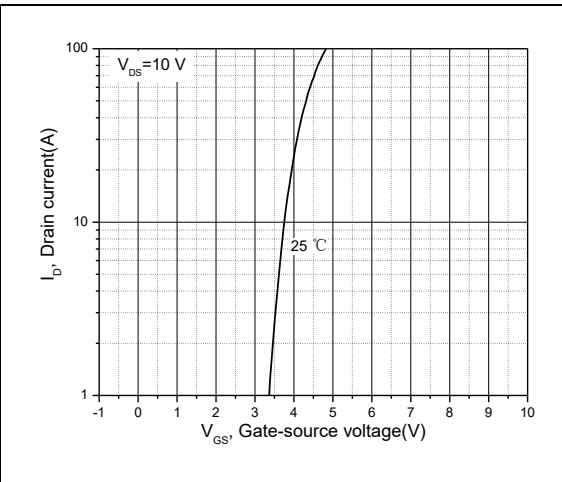


Figure 2, Typ. transfer characteristics

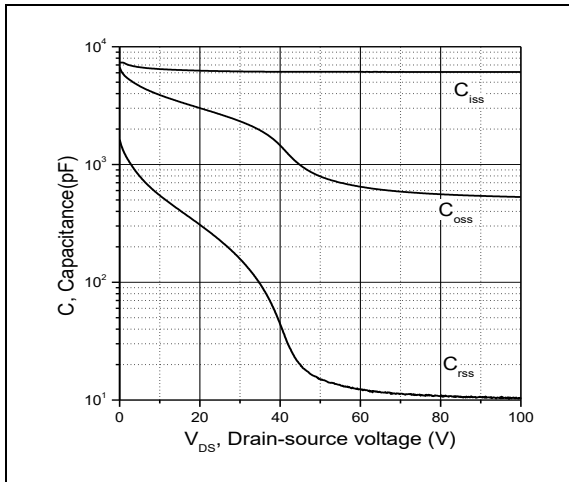


Figure 3, Typ. capacitances

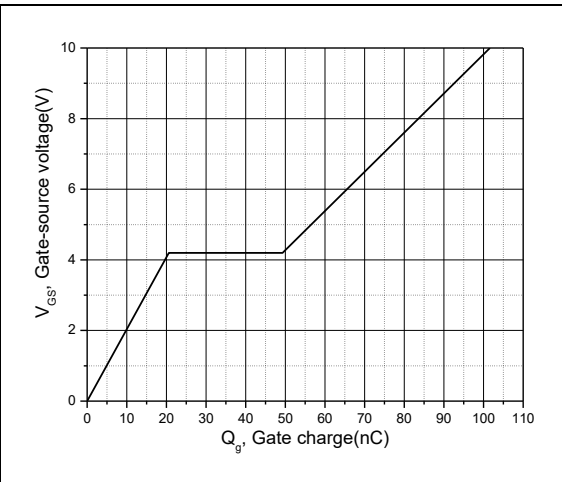


Figure 4, Typ. gate charge

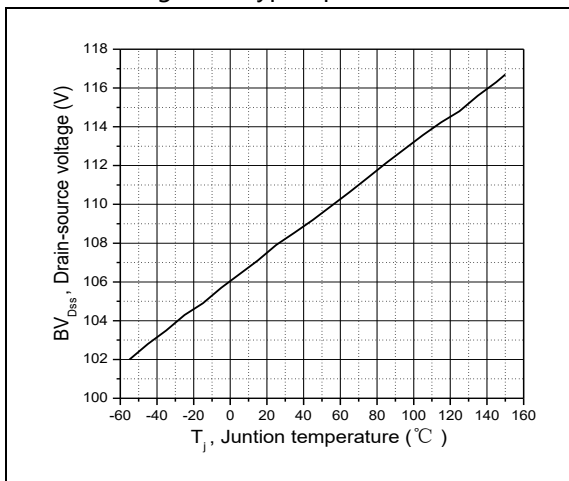


Figure 5, Drain-source breakdown voltage

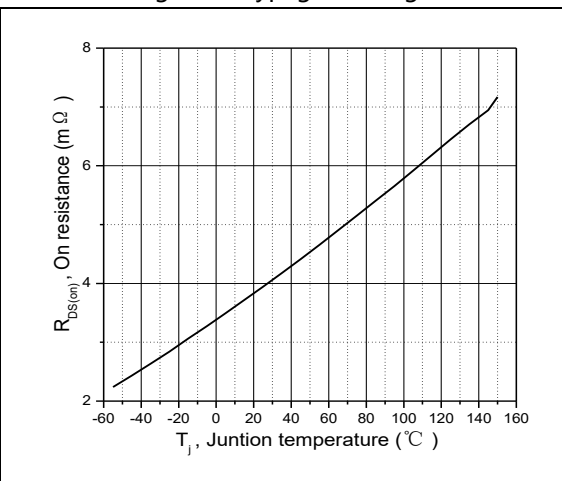


Figure 6, Drain-source on-state resistance

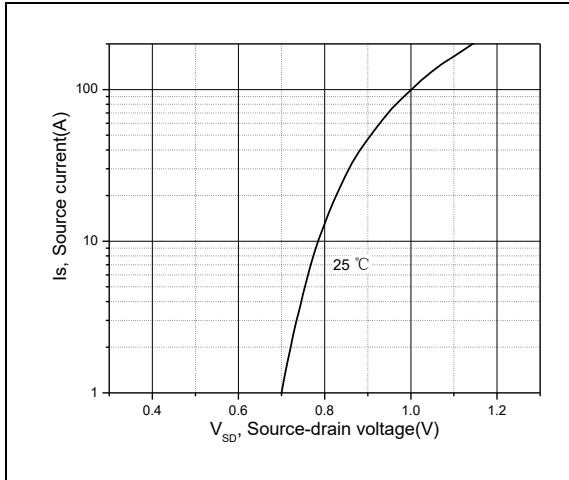


Figure 7, Forward characteristic of body diode

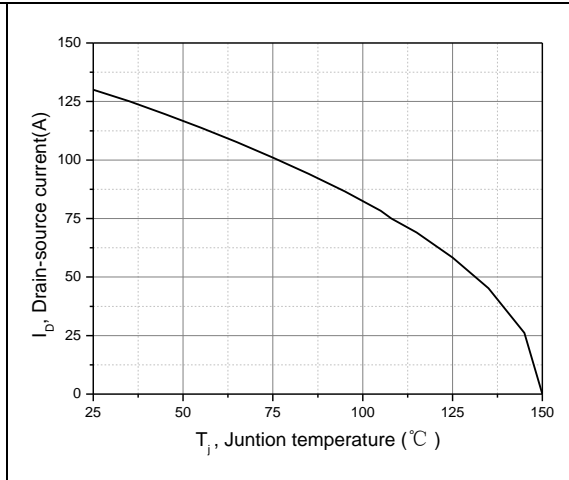


Figure 8, Drain current

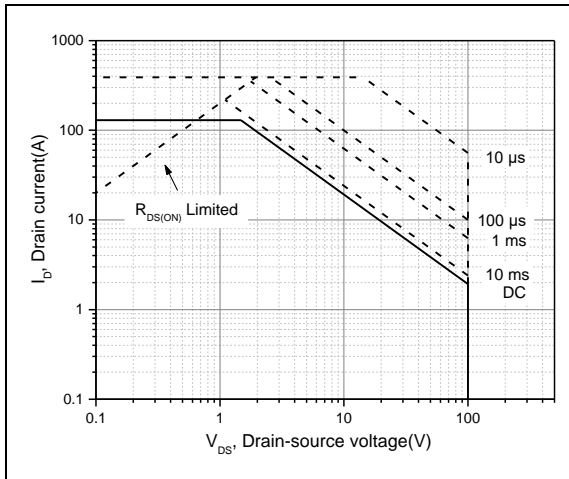


Figure 9, Safe operation area for TO220/TO263  
T<sub>C</sub>=25 °C

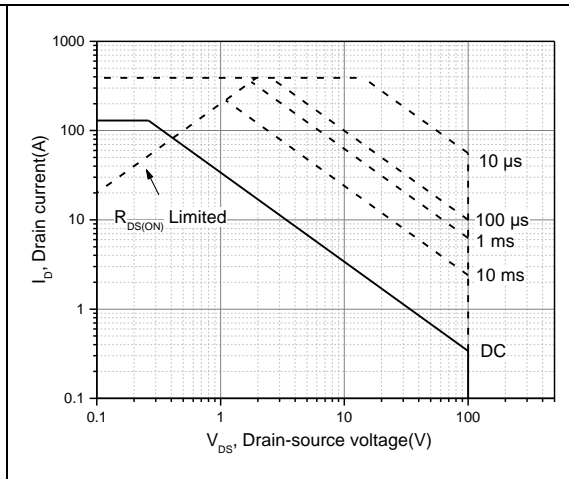


Figure 10, Safe operation area for TO220F  
T<sub>C</sub>=25 °C

■ Test circuits and waveforms

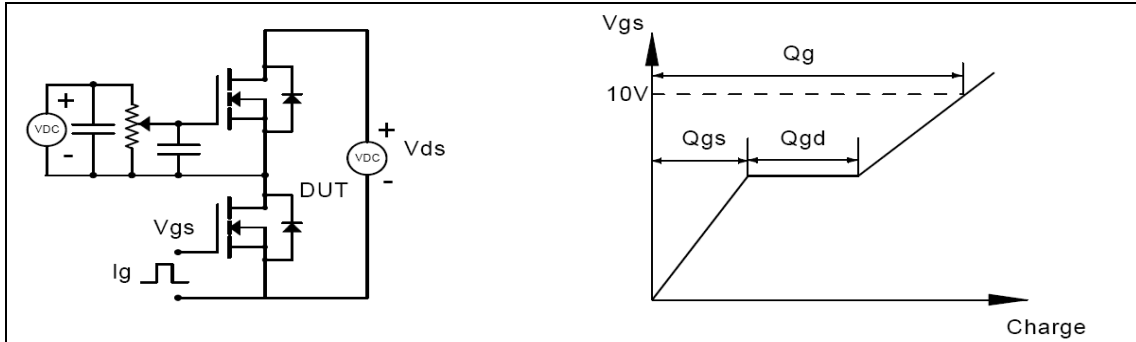


Figure 1, Gate charge test circuit & waveform

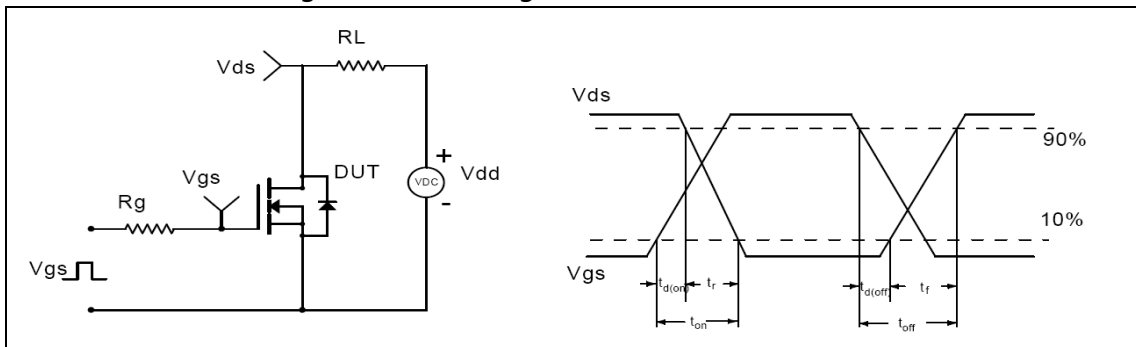


Figure 2, Switching time test circuit & waveforms

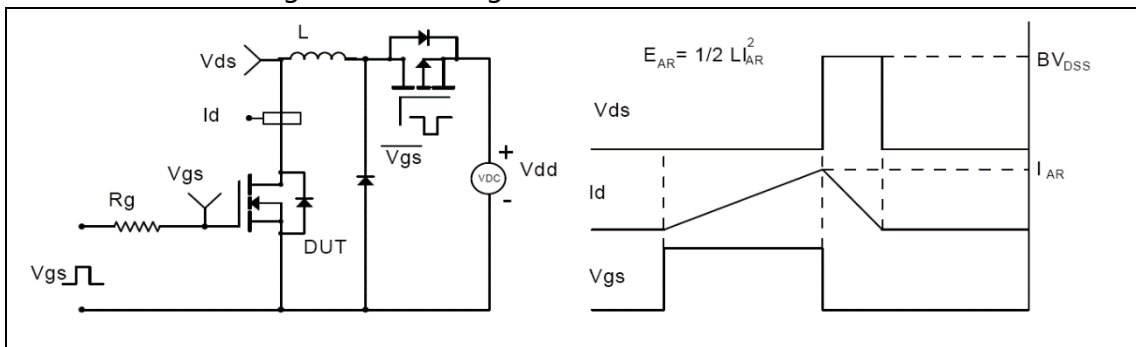


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

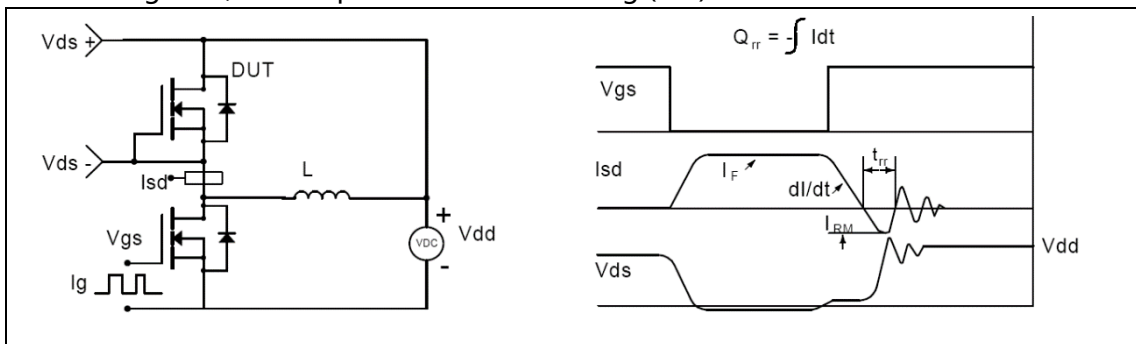
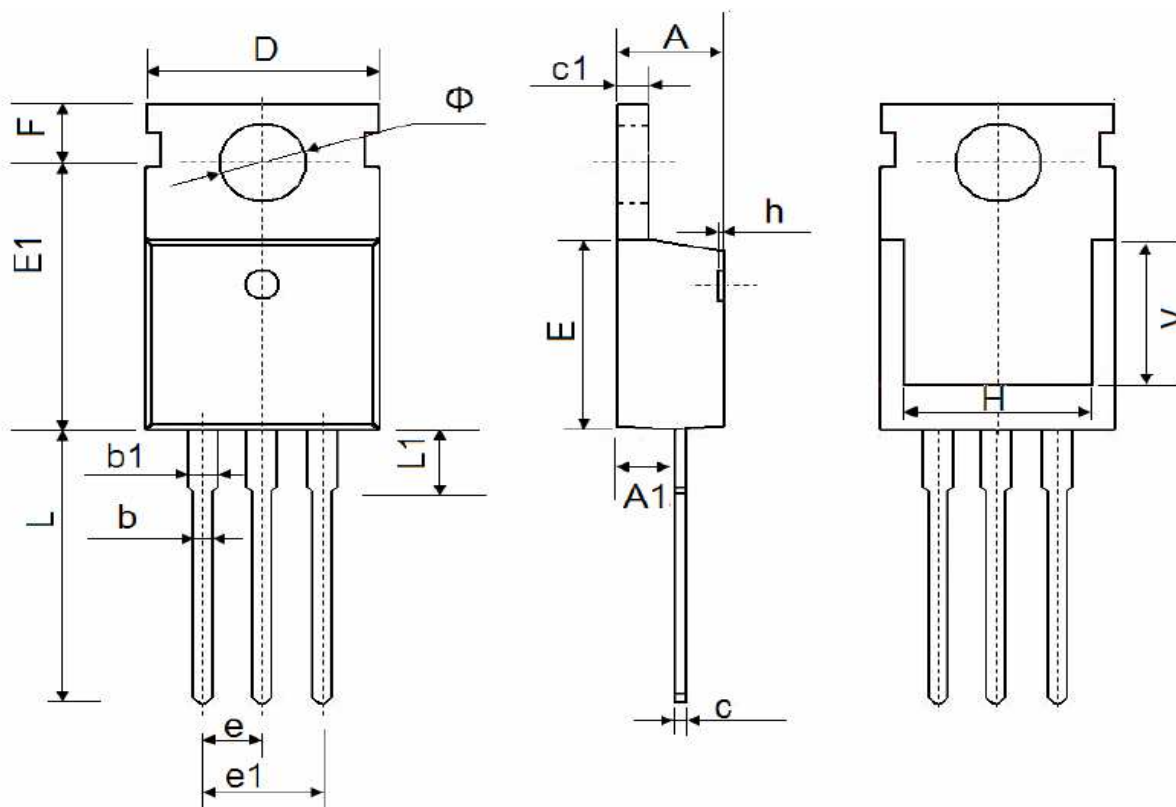


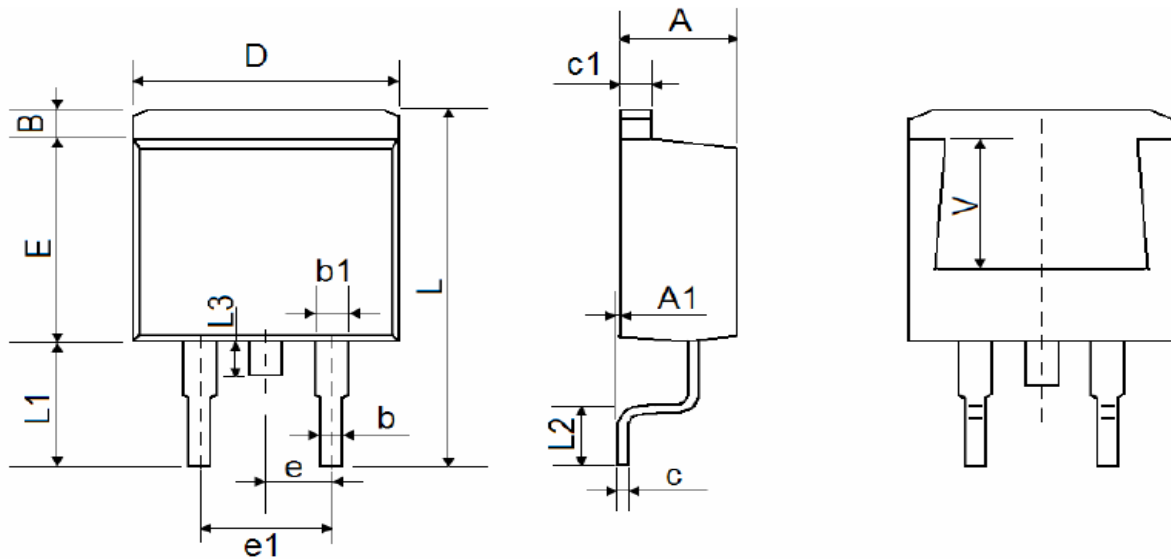
Figure 4, Diode reverse recovery test circuit & waveforms

## Package information TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
A1	2.25	2.55	0.089	0.1
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.33	0.65	0.013	0.026
c1	1.2	1.4	0.047	0.055
D	9.91	10.25	0.39	0.404
E	8.95	9.75	0.352	0.384
E1	12.65	12.95	0.498	0.51
e	2.540 Typ.		0.100 Typ.	
e1	4.98	5.18	0.196	0.204
F	2.65	2.95	0.104	0.116
H	7.9	8.1	0.311	0.319
h	0	0.3	0	0.012
L	12.9	13.4	0.508	0.528
L1	2.85	3.25	0.112	0.128
V	7.500 Ref.		0.295 Ref.	
Φ	3.4	3.8	0.134	0.15

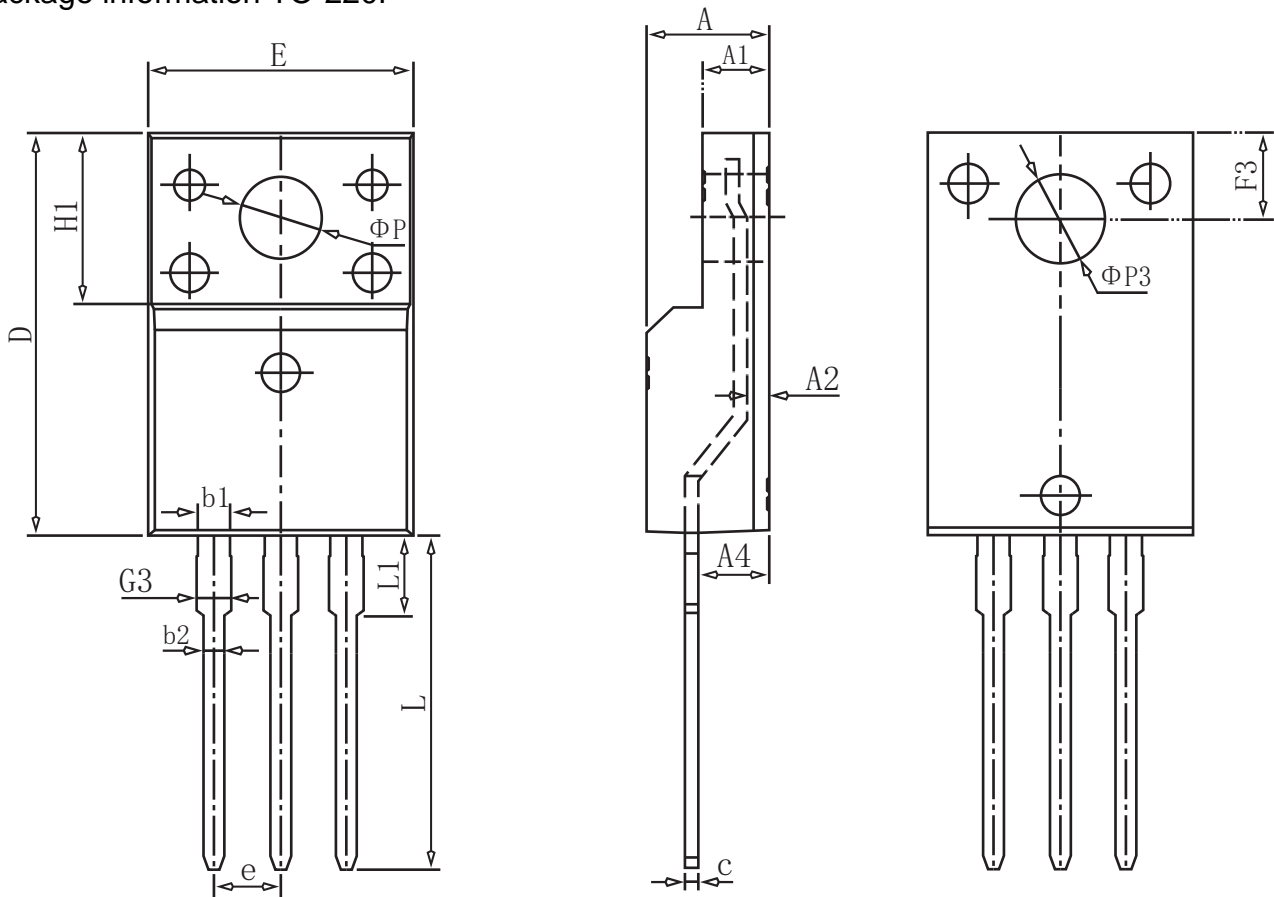
## Package information TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.47	4.67	0.176	0.184
A1	0	0.15	0	0.006
B	1.17	1.37	0.046	0.054
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.31	0.53	0.012	0.021
c1	1.17	1.37	0.046	0.054
D	10.01	10.31	0.394	0.406
E	8.5	8.9	0.335	0.35
e	2.540 Typ.		0.100 Typ.	
e1	4.98	5.18	0.196	0.204
L	15.05	15.45	0.593	0.608
L1	5.08	5.48	0.2	0.216
L2	2.34	2.74	0.092	0.108
L3	1.3	1.7	0.051	0.067
V	5.600 Ref.		0.220 Ref.	



## Package information TO-220F



### COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
E	10.00	10.20	10.40
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.65	0.85	1.30
A4	2.55	2.75	2.95
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
$\Phi P$	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
$\Phi P3$	3.45REF		
F3	3.10	3.30	3.50
G3	1.10	1.30	1.50
b1	1.05	1.20	1.35
b2	0.70	0.80	0.92

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