

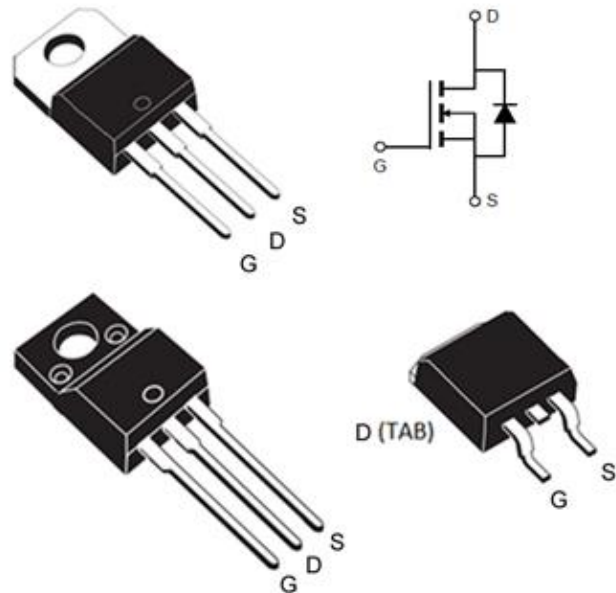
Features

- N-channel Power MOSFET
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria
- 100% UIL Tested

V_{DS}	100	V
I_D	120	A
$R_{DS(on)}@V_{GS}=10V$	<4.2	mΩ

Applications

- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)
- DC/DC converter



Product	Package	Packaging
YSP040N010T1A	TO-220	Tube
YSK038N010T1A	TO-263	Tube
YSF040N010T1A	TO-220F	Tube

Maximum Ratings ($T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Breakdown Voltage	V_{DS}	100	V
DC collector current, limited by T_{jmax} $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	120 110	A
Pulsed drain current, $T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}	I_{DM}	480	A
Avalanche energy, single pulse ($L=0.5\text{mH}$, $R_g=25\Omega$)	E_{AS}	306	mJ
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	236	W
Operating junction temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction - case	$R_{\theta(j-c)}$	0.54	$^\circ\text{C/W}$
Thermal resistance, junction – ambient(minimal footprint)	$R_{\theta(j-a)}$	70	$^\circ\text{C/W}$

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Static Characteristics						
Drain to Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu\text{A}$	100	108	-	V
G-S Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{CS}, I_D = 250\mu\text{A}$	2.0	3.0	4.0	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	- -	0.05 10	1 100	μA
G-S Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	± 10	± 100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 50A$ TO-220 TO-263	-	3.4 3.2	4.2 4.0	$\text{m}\Omega$
Transconductance	g_{fs}	$V_{DS} = 5V, I_D = 50A$	-	50	-	S

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Dynamic						
Input capacitance	C_{iss}	$V_{DS} = 50V, V_{GS} = 0V,$ $f = 1MHz$	-	4700	-	pF
Output capacitance	C_{oss}		-	1080	-	
Reverse transfer capacitance	C_{rss}		-	31	-	
Gate Total Charge	Q_g	$V_{GS}=10V, V_{DS}=50V,$ $I_D=20A, f=1MHz$		67		nC
Gate-Source charge	Q_{gs}			27		
Gate-Drain charge	Q_{gd}			11		
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=10V, V_{DS}=50V,$ $R_G=3.0\Omega$		29		ns
Rise Time	t_r			84		
Turn-off Delay Time	$t_{d(off)}$			46		
Fall Time	t_f			93		
Gate resistance	R_G	$V_{DS} = 0V, V_{GS} = 0V,$ $f=1MHz$	-	1.8	-	Ω

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Body Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	$I_{SD} = 50A, V_{GS}=0V$		0.85	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 50A, dI/dt=100A/\mu s$		67		ns
Body Diode Reverse Recovery Charge	Q_{rr}				125	

Typical Performance Characteristics

Fig1: Output Characteristics

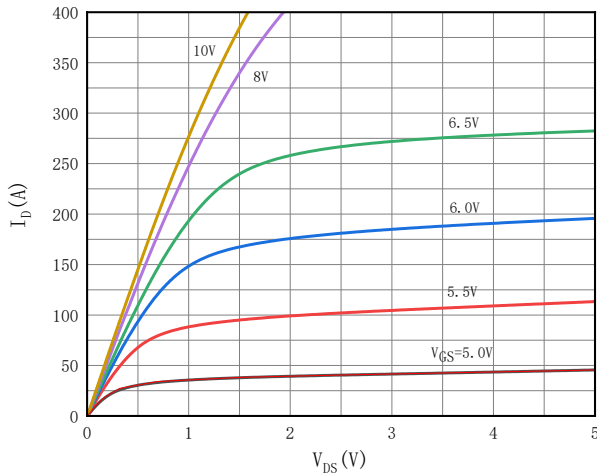


Fig2: Transfer Characteristics

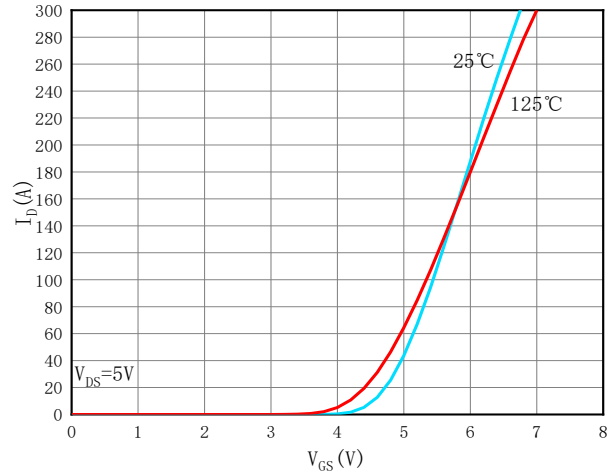


Fig3: Rds(on) vs Gate Voltage

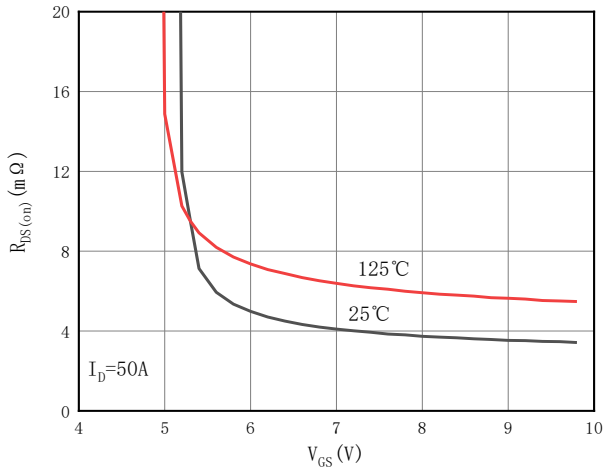


Fig4: Rds(on) vs Drain Current and Gate Voltage

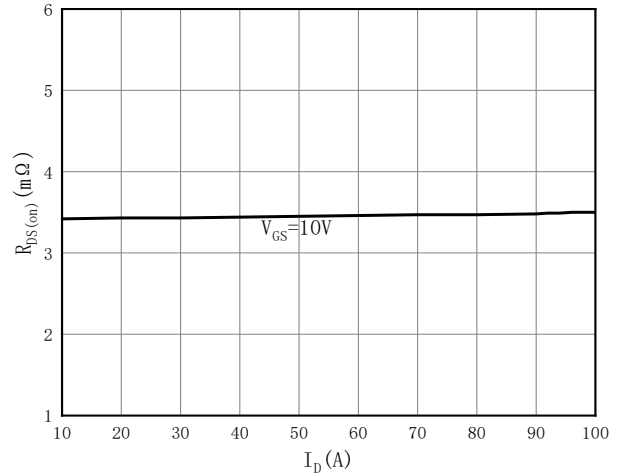


Fig5: Rds(on) vs. Temperature

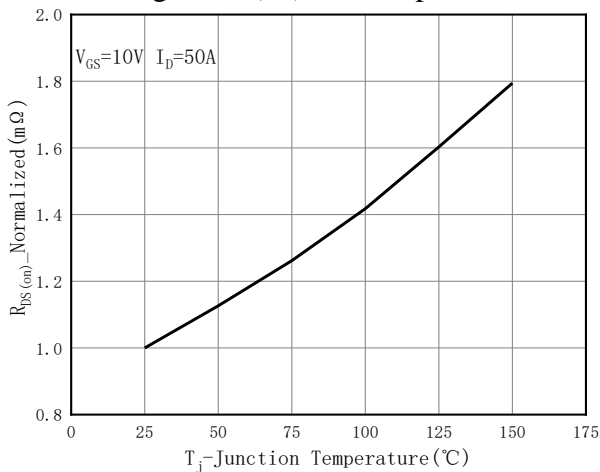


Fig6: Capacitance Characteristics

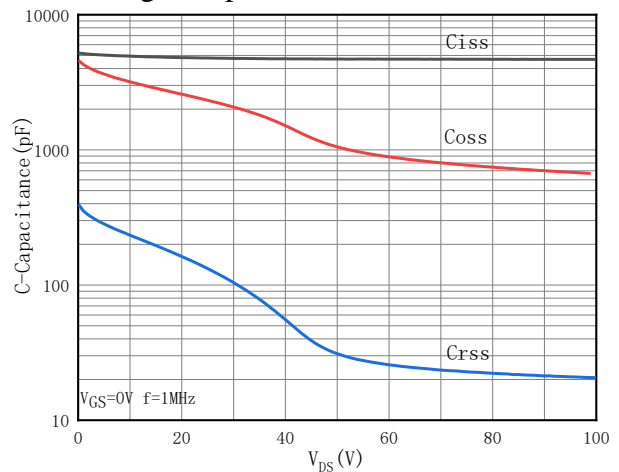


Fig7: Gate Charge Characteristics

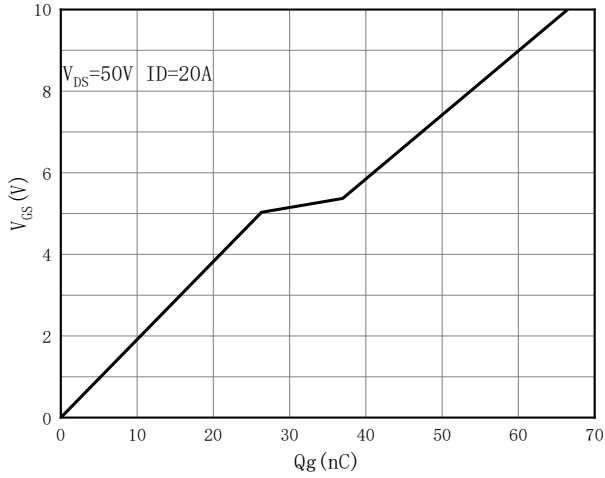


Fig8: Body-diode Forward Characteristics

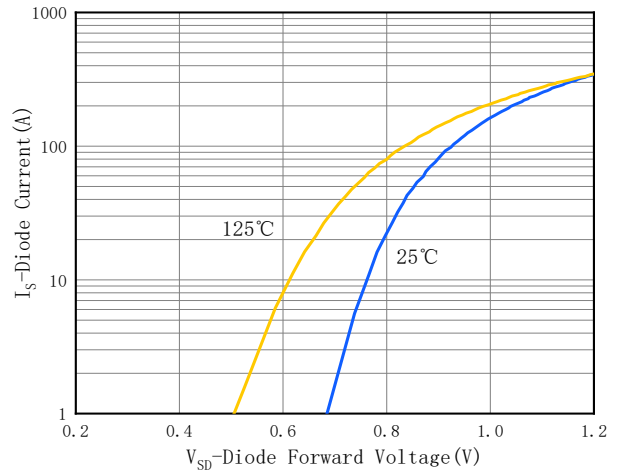


Fig9: Power Dissipation

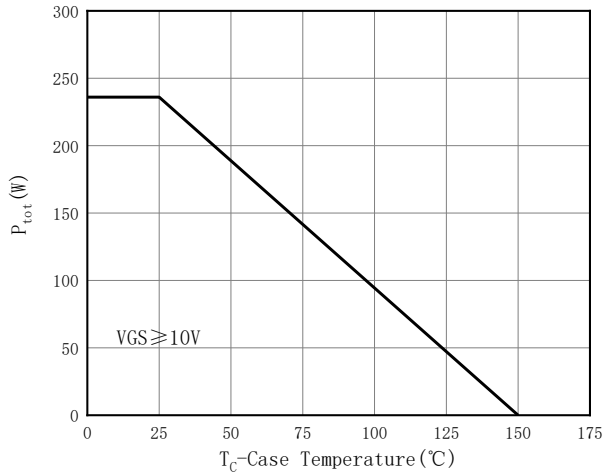


Fig10: Drain Current Derating

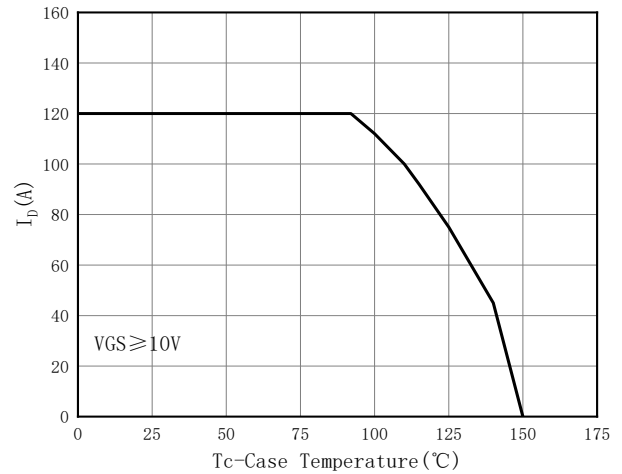


Fig11: Safe Operating Area

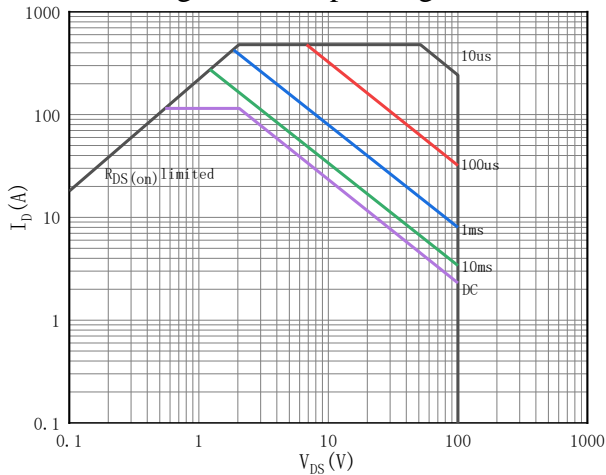
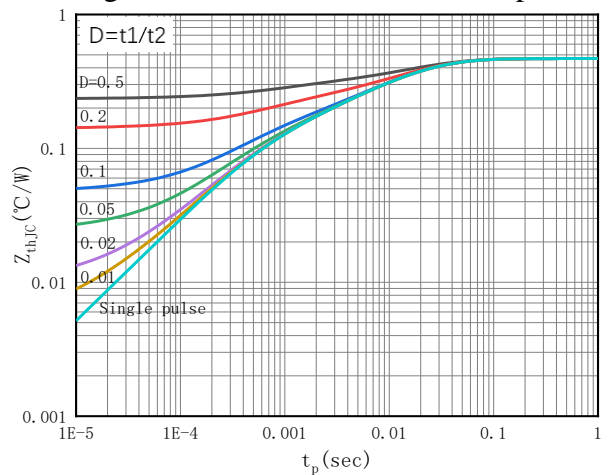
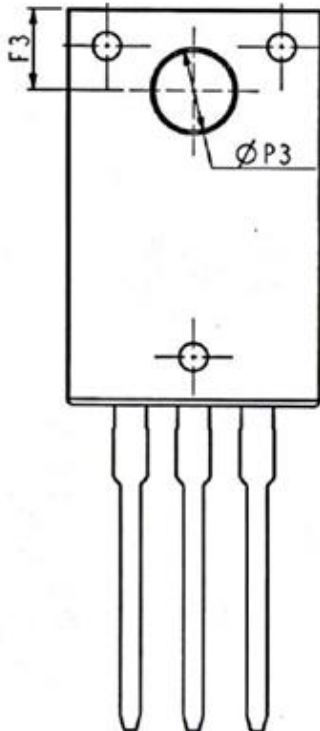
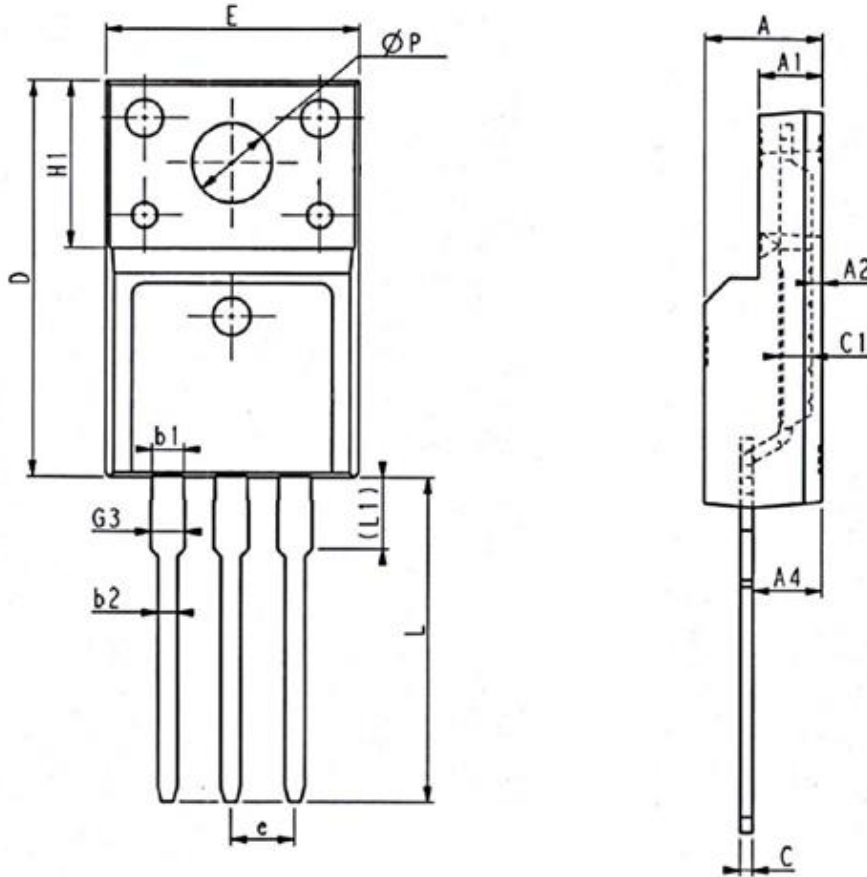


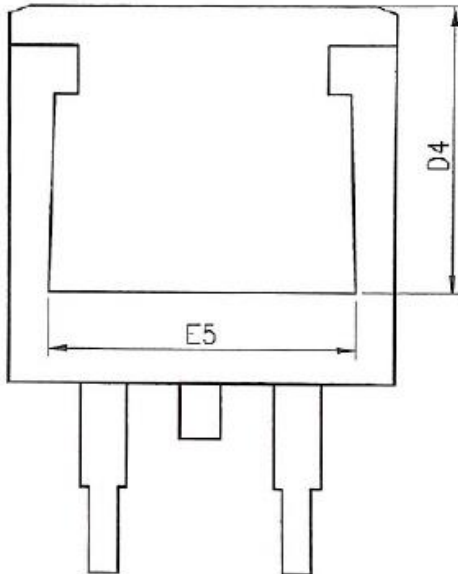
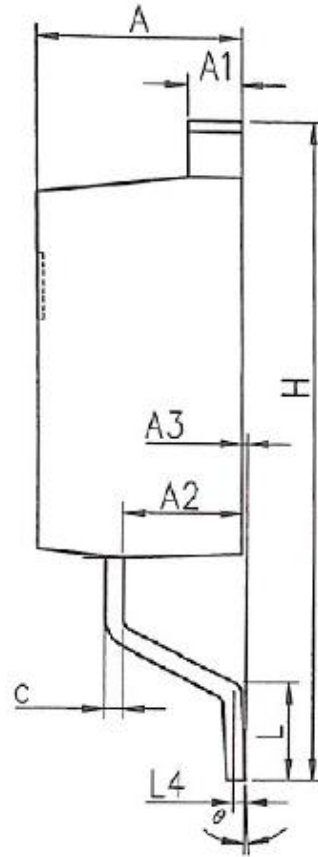
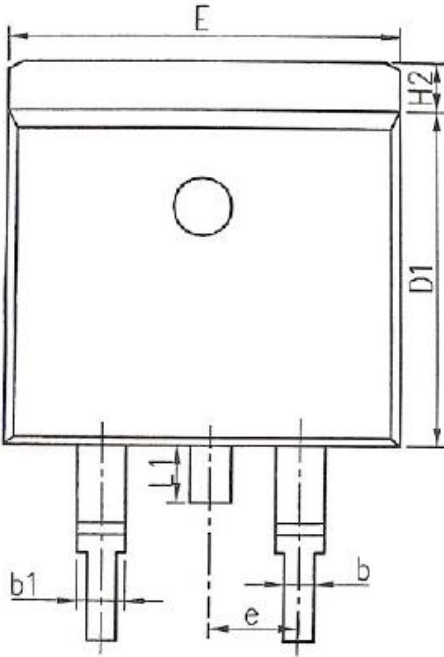
Fig12: Max. Transient Thermal Impedance



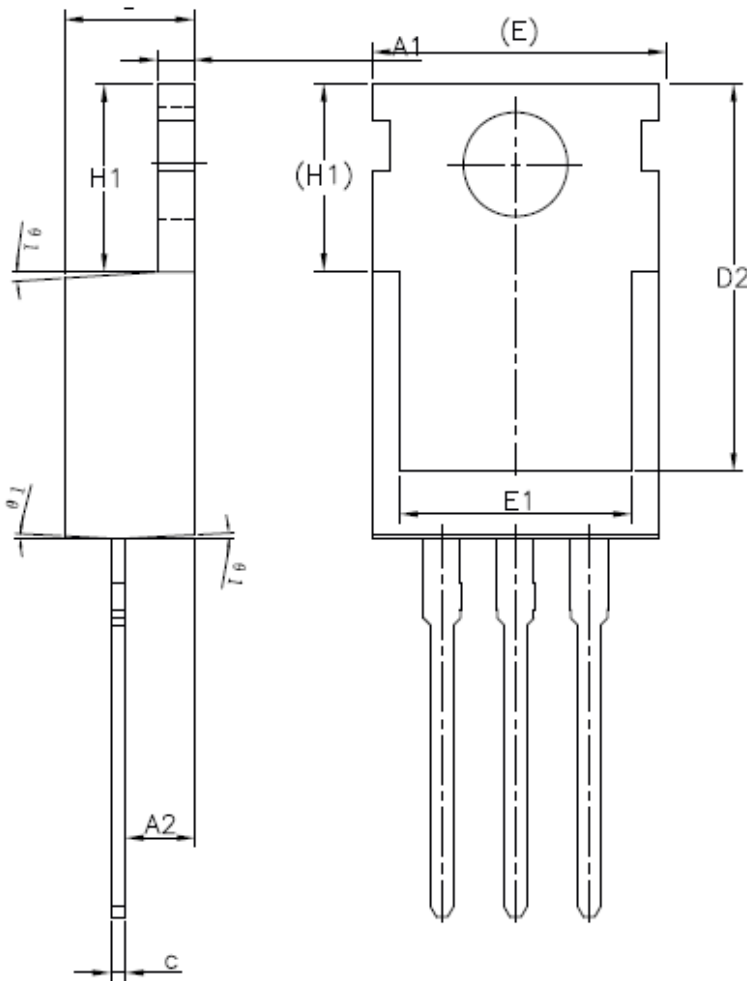
TO-220F package information


SYMBOL			
	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	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
$\Phi P3$	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

TO-263 package information



SYMBOL	MM		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-
E	9.88	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4	0.25 BSC		
θ	0°	5°	9°

TO-220 package information


SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	—	0.90
b1	1.27	—	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	—	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	—	—	3.50
L2	4.60REF		
∅P	3.55	3.60	3.65
Q	2.73	—	2.87
θ1	1°	3°	5°

