DGF20N65CTL0

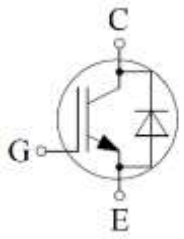
RoHS COMPLIANT

IGBT Discrete



V_{CE}	650	V
I_C	20	A
$V_{CE(SAT)}$ I_C=20A	1.60	V

Circuit



Applications

- Soft switching applications
- Air conditioning
- Motor drive inverter

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175℃
- Positive temperature coefficient
- High ruggedness, temperature stable

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_C	25 15	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_F	25 15	A
Continuous Gate-Emitter Voltage	V_{GE}	±20	V
Transient Gate-Emitter Voltage (tp≤10μs,D<0.010)	V_{GE}	±30	V
Turn off Safe Operating Area V_{CE}≤ 600V, T_j≤ 150°C		60	A
Pulsed Collector Current, V_{GE}=15V, tp limited by T_{jmax}	I_{CM}	60	A
Short Circuit Withstand Time, VGE= 15V, VCE≤ 400V	Tsc	5	μs
Diode Pulsed Current, tp limited by T_{jmax}	I_{Fpuls}	60	A
Power Dissipation , Tj=175°C,Tc=25°C	P_{tot}	37	W

Operating Junction Temperature	T_j	-40...+175	°C
Storage Temperature	T_s	-55...+150	°C
Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	°C

Electrical Characteristics of the IGBT（T_j= 25℃unless otherwise specified）:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	V_{GE}=0V, I_C=250μA	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=1mA	5.0	5.8	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=20A T_j=25°C, T_j=125°C T_j=150°C		1.60 1.75 1.80	1.95	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j= 25°C, T_j=150°C			0.25 1.00	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V_{GE}= ± 20V			±200	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f = 1MHz	-	0.90	-	nF
Output capacitance	C_{oes}		-	0.04	-	
Reverse Transfer Capacitance	C_{res}		-	0.01	-	
Gate Charge	Q_G	V_{CC}=300V,I_C=20A, V_{GE}=15V	-	0.085	-	uC
Short circuit collector current	$I_{C(SC)}$	V_{GE}=15V,t_{SC}≤5us V_{CC}=400V, $T_{j,start}$=25°C	-	115	-	A

Electrical Characteristics of the Diode（T_j= 25℃unless otherwise specified）:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V_F	I_F=20A T_j= 25°C, T_j= 125°C T_j= 150°C		2.00 1.80 1.70	2.50	V

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=25°C V_{CC}= 300V, I_C=20A, V_{GE}=-5V~15V, Rg=51Ω	-	12	-	ns
Rise Time	t_r		-	33	-	ns
Turn-on Energy	E_{on}		-	0.41	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	68	-	ns
Fall Time	t_f		-	129	-	ns
Turn-off Energy	E_{off}		-	0.22	-	mJ
Dynamic , at T_j= 125℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=125°C V_{CC}= 300V, I_C=20A, V_{GE}=-5V~15V, Rg=51Ω	-	16	-	ns
Rise Time	t_r		-	41	-	ns
Turn-on Energy	E_{on}		-	0.48	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	69	-	ns
Fall Time	t_f		-	154	-	ns
Turn-off Energy	E_{off}		-	0.35	-	mJ
Dynamic , at T_j= 150℃						
Turn-on Delay Time	$t_{d(on)}$	T_j=150°C V_{CC}= 300V, I_C=20A, V_{GE}=-5V~15V, Rg=51Ω	-	18	-	ns
Rise Time	t_r		-	49	-	ns
Turn-on Energy	E_{on}		-	0.52	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	69	-	ns
Fall Time	t_f		-	173	-	ns
Turn-off Energy	E_{off}		-	0.38	-	mJ

Electrical Characteristics of the DIODE

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25℃						
Reverse Recovery Current	I_{rr}	I_F=20A, V_R=300V, -di/dt= 360A/μs,	-	6	-	A
Diode reverse recovery time	trr		-	200	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.25	-	uC
Reverse Recovery Energy	Erec		-	0.07	-	mJ
Dynamic , at Tj= 125℃						
Reverse Recovery Current	I_{rr}	I_F=20A, V_R=300V, -di/dt= 360A/μs,	-	8	-	A
Diode reverse recovery time	trr		-	218	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.59	-	uC
Reverse Recovery Energy	Erec		-	0.13	-	mJ
Dynamic , at Tj= 150℃						
Reverse Recovery Current	I_{rr}	I_F=20A, V_R=300V, -di/dt= 360A/μs,	-	9	-	A
Diode reverse recovery time	trr		-	227	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.78	-	uC
Reverse Recovery Energy	Erec		-	0.16	-	mJ

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R_{th}(j-c)	4.0	K/W
Diode Thermal Resistance, Junction - Case	R_{th}(j-c)	4.8	K/W
Thermal Resistance, Junction - Ambient	R_{th}(j-a)	60	K/W

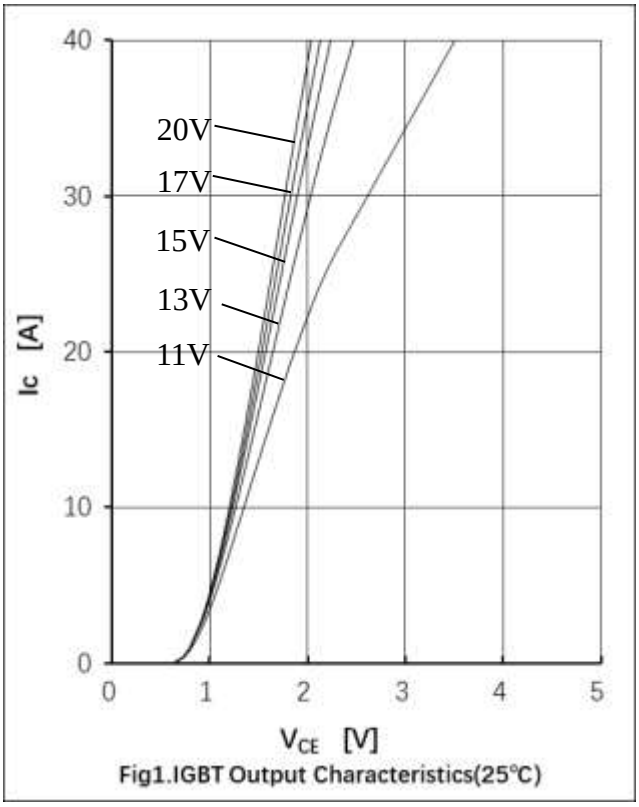


Fig1.IGBT Output Characteristics(25℃)

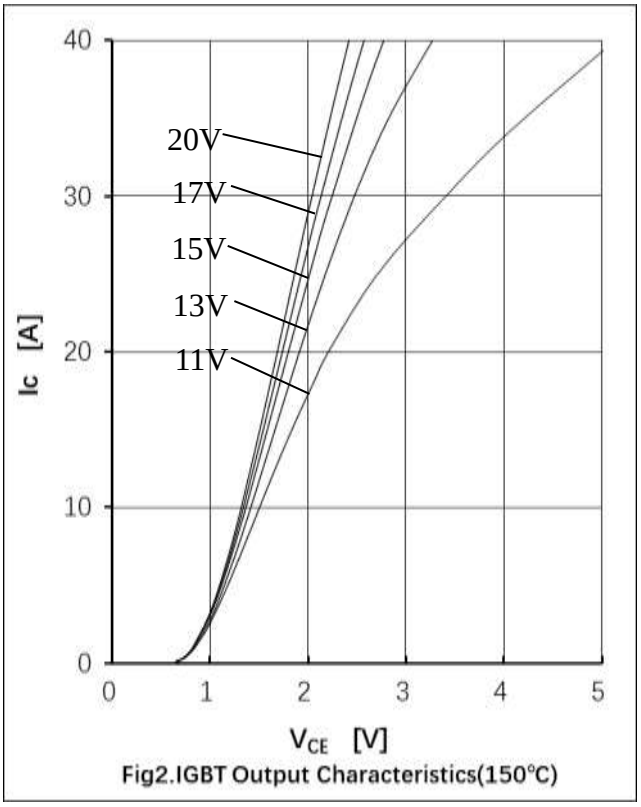


Fig2.IGBT Output Characteristics(150℃)

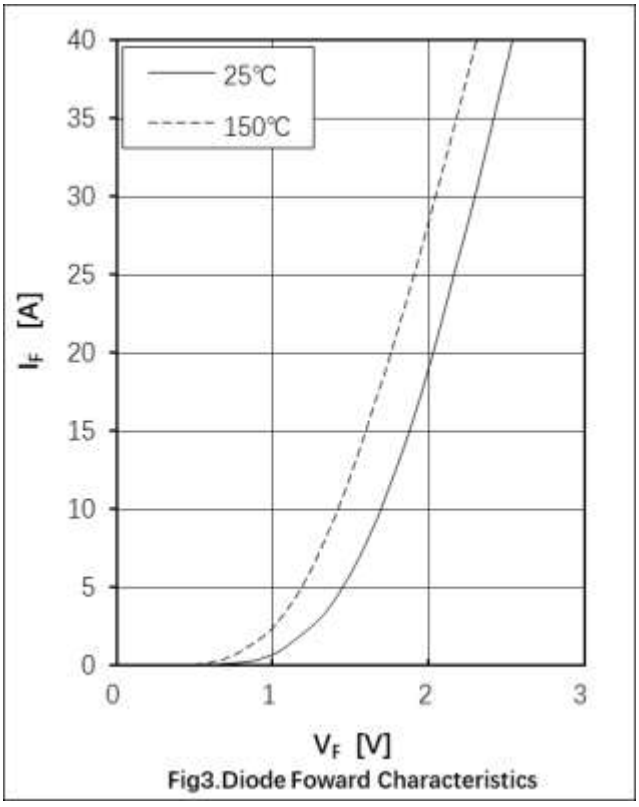


Fig3.Diode Foward Characteristics

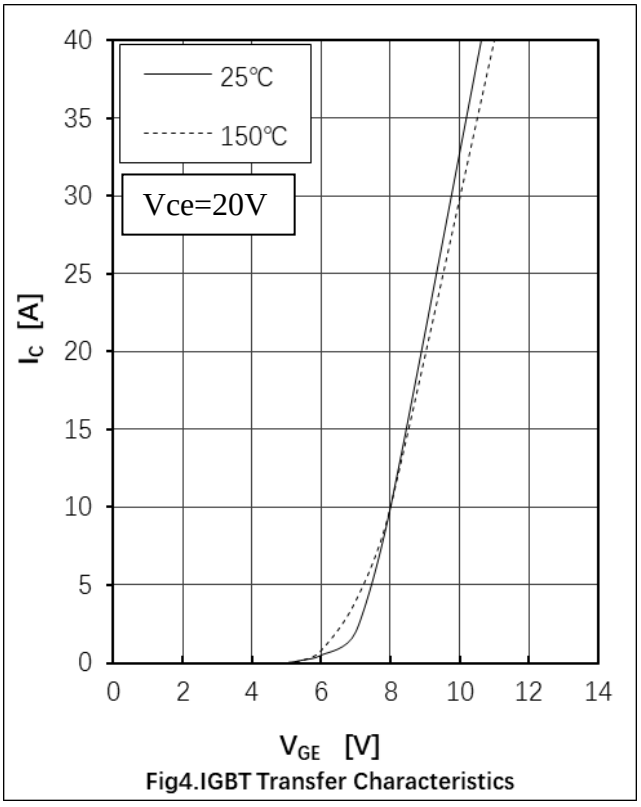


Fig4.IGBT Transfer Characteristics

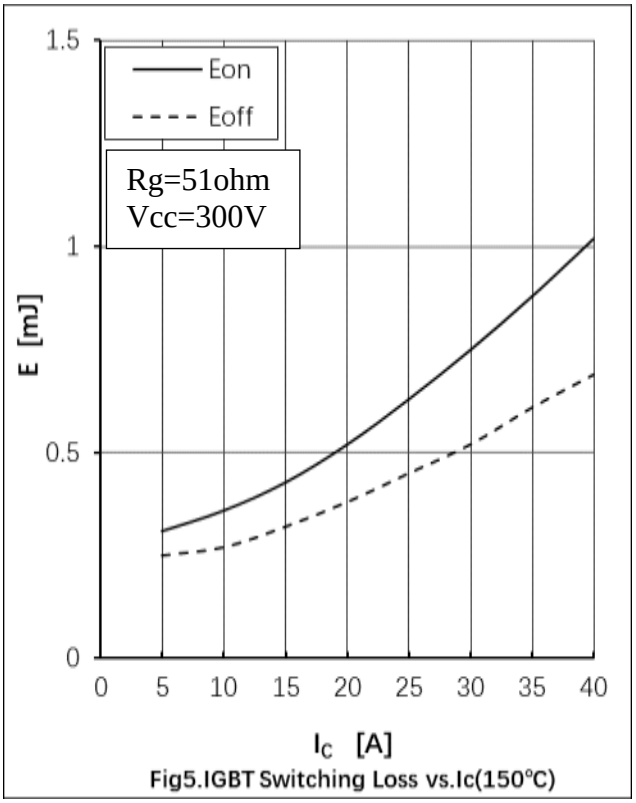


Fig5.IGBT Switching Loss vs.Ic(150°C)

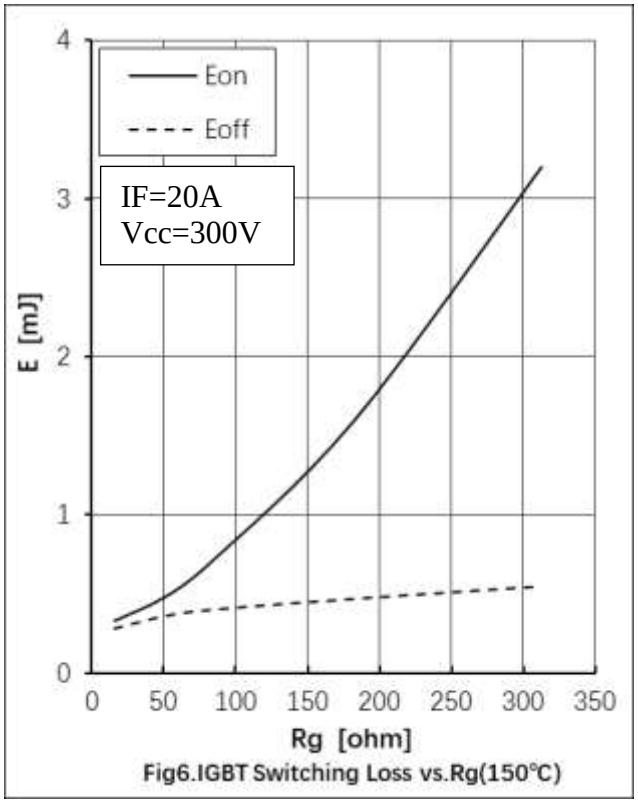


Fig6.IGBT Switching Loss vs.Rg(150°C)

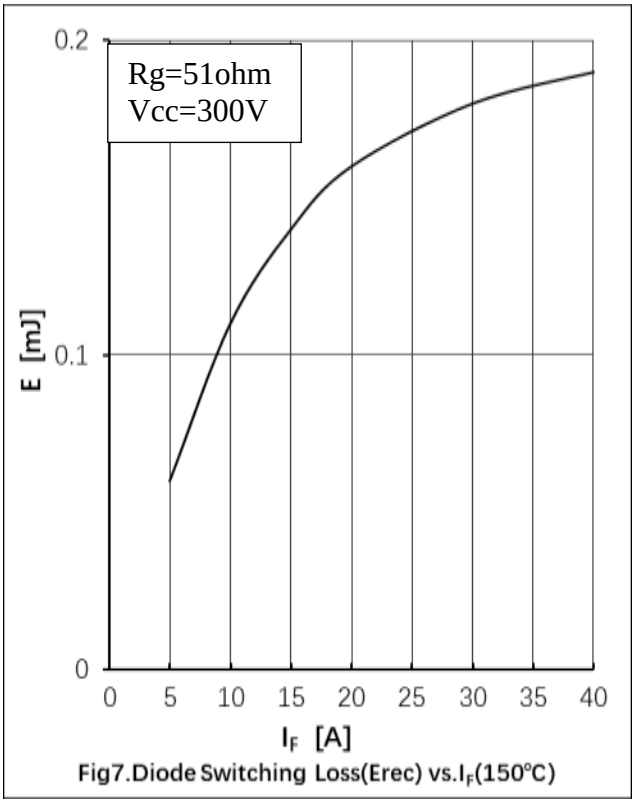


Fig7.Diode Switching Loss(Erec) vs.I_F(150°C)

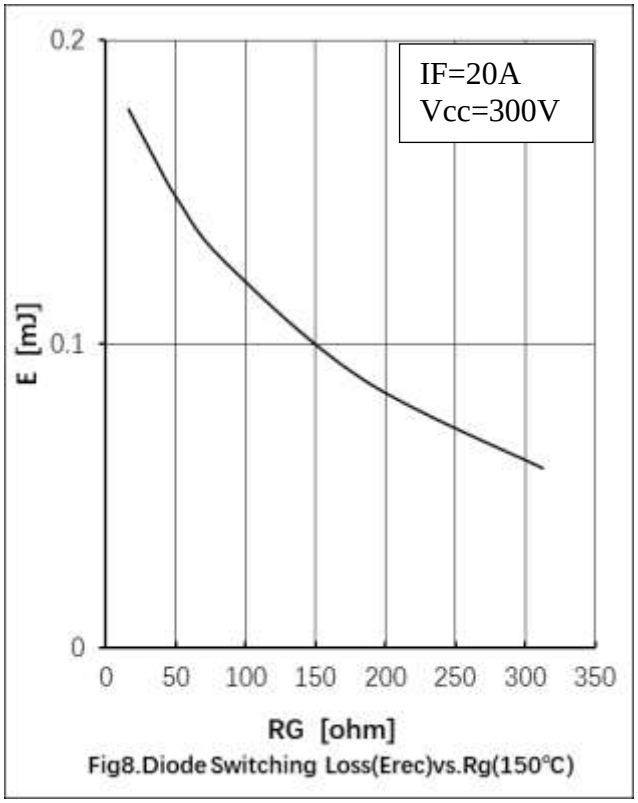


Fig8.Diode Switching Loss(Erec)vs.Rg(150°C)

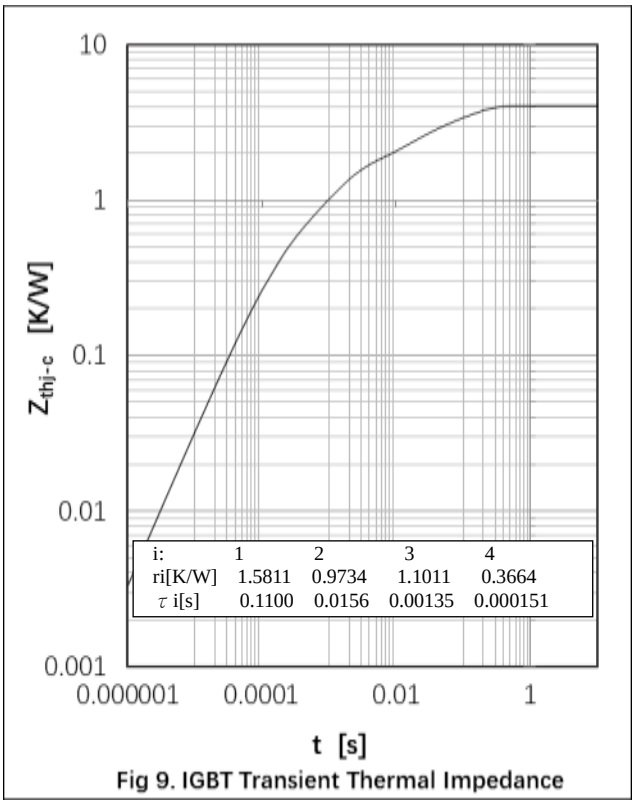


Fig 9. IGBT Transient Thermal Impedance

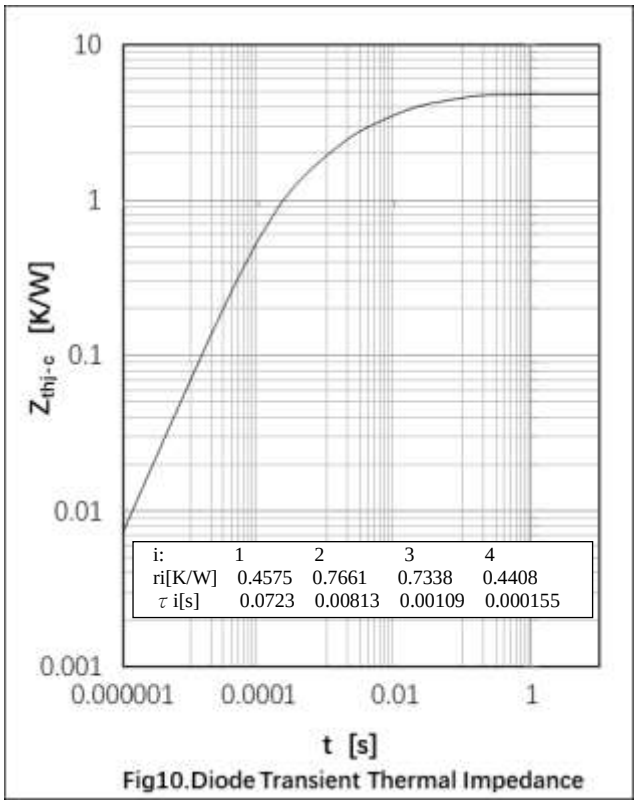
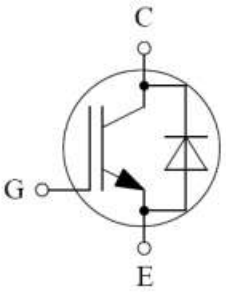


Fig10.Diode Transient Thermal Impedance

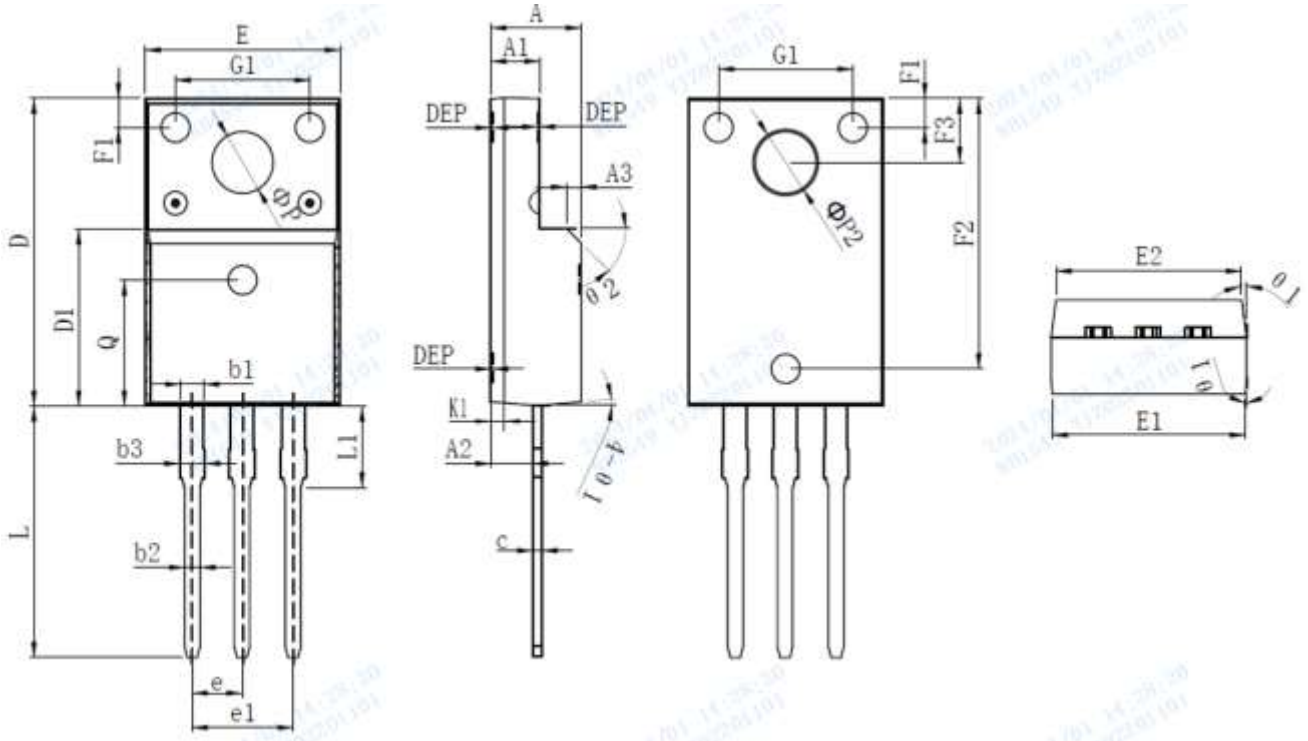
Circuit Diagram





Package Outline Information

CASE: TO-220F package information



SYMBOL	单位：mm			SYMBOL	单位：mm			SYMBOL	单位：mm		
	MIN	NOM	MAX		MIN	NOM	MAX		MIN	NOM	MAX
A	4.40	4.50	4.60	E	10.00	10.16	10.30	ΦP2	3.30	3.40	3.50
A1	2.34	2.54	2.74	E1	9.94	10.06	10.20	θ1	3°	5°	7°
A2	2.66	2.76	2.86	E2	9.40	9.50	9.60	θ2	42°	45°	48°
A3		1.0REF		F1	1.40	1.50	1.60				
b1	1.18	1.20	1.24	F2	13.80	13.90	14.00				
b2	0.75	0.80	0.85	F3	3.20	3.30	3.40				
b3	1.22	1.30	1.38	G1	6.90	7.00	7.10				
C	0.45	0.50	0.55	K1	0.65	0.70	0.75				
D	15.67	15.87	16.07	L	12.78	12.98	13.18				
D1	9.04	9.12	9.20	L1	3.40	3.50	3.60				
e	2.50	2.54	2.58	Q		6.50REF					
e1		5.08REF		ΦP	3.08	3.18	3.28				

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