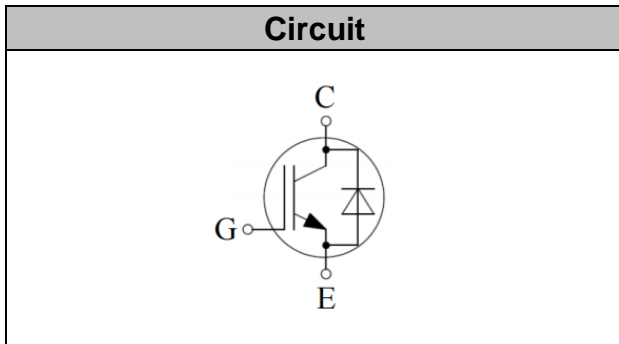


IGBT Discrete

V_{CE}	650	V
I_C	15	A
$V_{CE(SAT)} I_C=15A$	1.40	V



Applications

- Soft switching applications
- Air conditioning
- Motor drive inverter

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175°C
- 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} $T_C=25^\circ C$ $T_C=100^\circ C$	I_C	20 10	A
Diode Forward Current, limited by T_{jmax} $T_C=25^\circ C$ $T_C=100^\circ C$	I_F	20 10	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ($t_p \leq 10\mu s, D < 0.010$)	V_{GE}	± 30	V
Turn off Safe Operating Area $V_{CE} \leq 600V$, $T_j \leq 150^\circ C$		45	A
Pulsed Collector Current, $V_{GE}=15V$, t_p limited by T_{jmax}	I_{CM}	45	A
Short Circuit Withstand Time, $V_{GE}=15V$, $V_{CE} \leq 400V$	T_{SC}	5	μs
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	45	A
Power Dissipation, $T_j=175^\circ C, T_c=25^\circ C$	P_{tot}	34	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 ($T_j=25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	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	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$ $T_j=25^\circ\text{C}$, $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$		1.40 1.55 1.60	1.70	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ\text{C}$, $T_j=150^\circ\text{C}$			0.25 1.00	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$			± 200	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$	-	0.88	-	nF
Output capacitance	C_{oes}		-	0.04	-	
Reverse Transfer Capacitance	C_{res}		-	0.01	-	
Gate Charge	Q_G	$V_{CC}=300V, I_C=15A,$ $V_{GE}=15V$	-	0.069	-	μC
Short circuit collector current	$I_{C(SC)}$	$V_{GE}=15V, t_{SC}\leq 5\mu\text{s}$ $V_{CC}=400V,$ $T_{j,start}=25^\circ\text{C}$	-	110	-	A

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V _F	I _F = 15A T _j = 25°C, T _j = 125°C T _j = 150°C		1.90 1.70 1.60	2.40	V

Switching Characteristic, Inductive Load

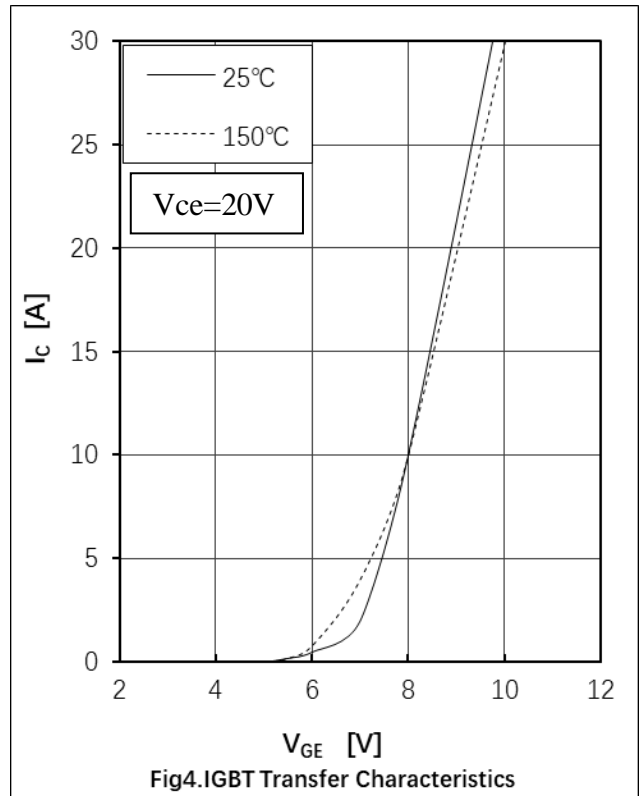
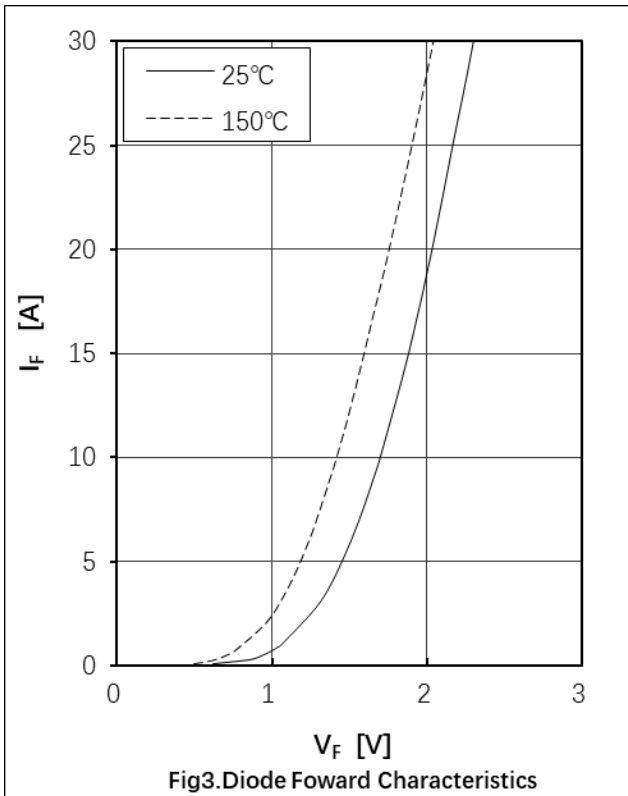
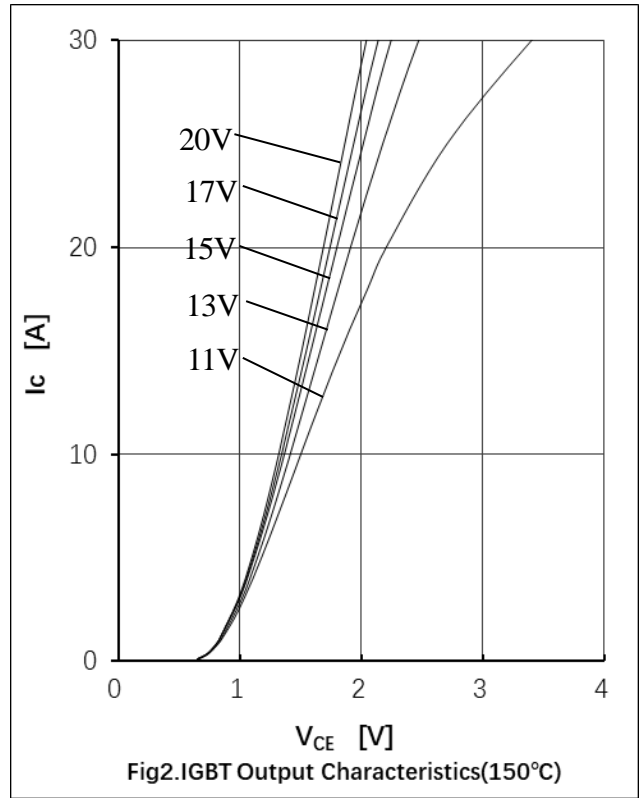
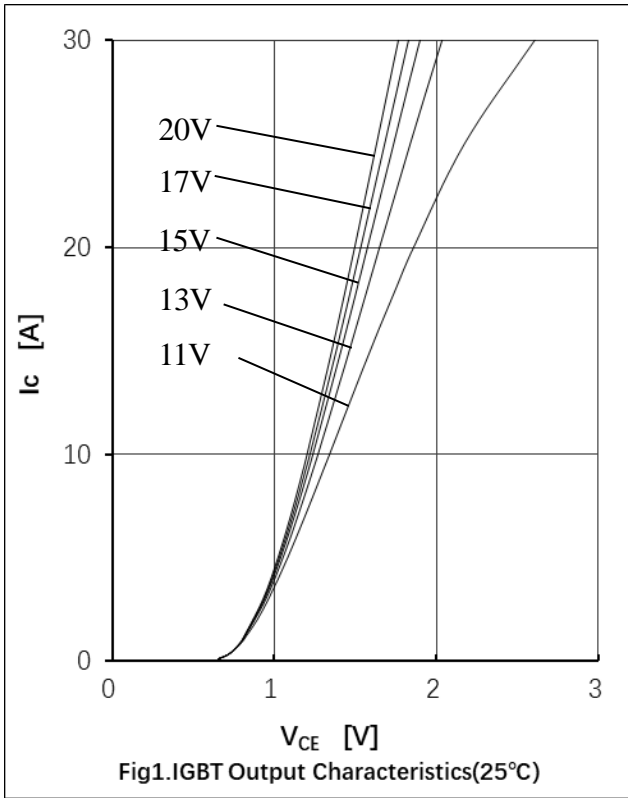
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25 °C						
Turn-on Delay Time	t _{d(on)}	T _j =25°C V _{CC} = 300V, I _C =15A, V _{GE} =-5V~15V, R _g =51 Ω	-	10	-	ns
Rise Time	t _r		-	28	-	ns
Turn-on Energy	E _{on}		-	0.33	-	mJ
Turn-off Delay Time	t _{d(off)}		-	68	-	ns
Fall Time	t _f		-	138	-	ns
Turn-off Energy	E _{off}		-	0.16	-	mJ
Dynamic , at T_j= 125 °C						
Turn-on Delay Time	t _{d(on)}	T _j =125°C V _{CC} = 300V, I _C =15A, V _{GE} =-5V~15V, R _g =51 Ω	-	14	-	ns
Rise Time	t _r		-	36	-	ns
Turn-on Energy	E _{on}		-	0.38	-	mJ
Turn-off Delay Time	t _{d(off)}		-	69	-	ns
Fall Time	t _f		-	161	-	ns
Turn-off Energy	E _{off}		-	0.27	-	mJ
Dynamic , at T_j= 150 °C						
Turn-on Delay Time	t _{d(on)}	T _j =150°C V _{CC} = 300V, I _C =15A, V _{GE} =-5V~15V, R _g =51 Ω	-	16	-	ns
Rise Time	t _r		-	43	-	ns
Turn-on Energy	E _{on}		-	0.43	-	mJ
Turn-off Delay Time	t _{d(off)}		-	69	-	ns
Fall Time	t _f		-	182	-	ns
Turn-off Energy	E _{off}		-	0.32	-	mJ

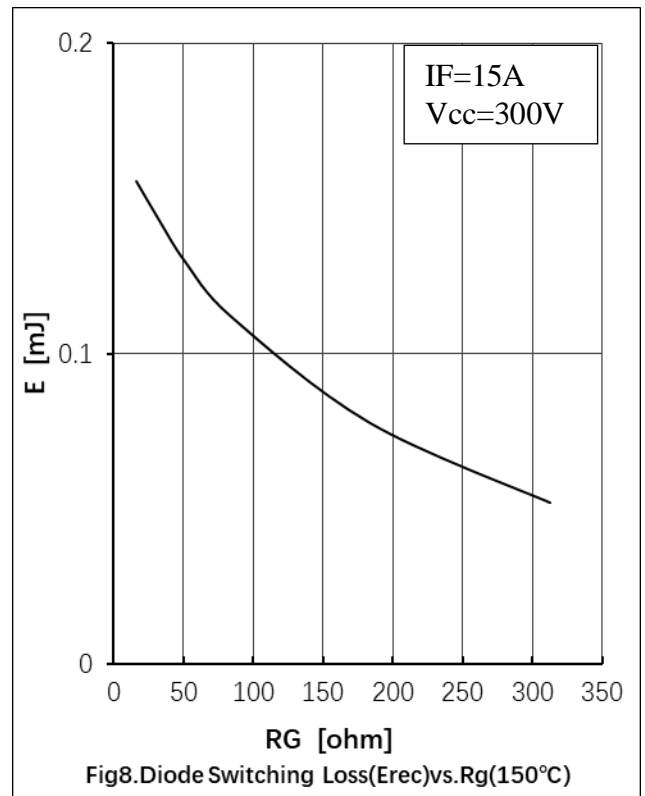
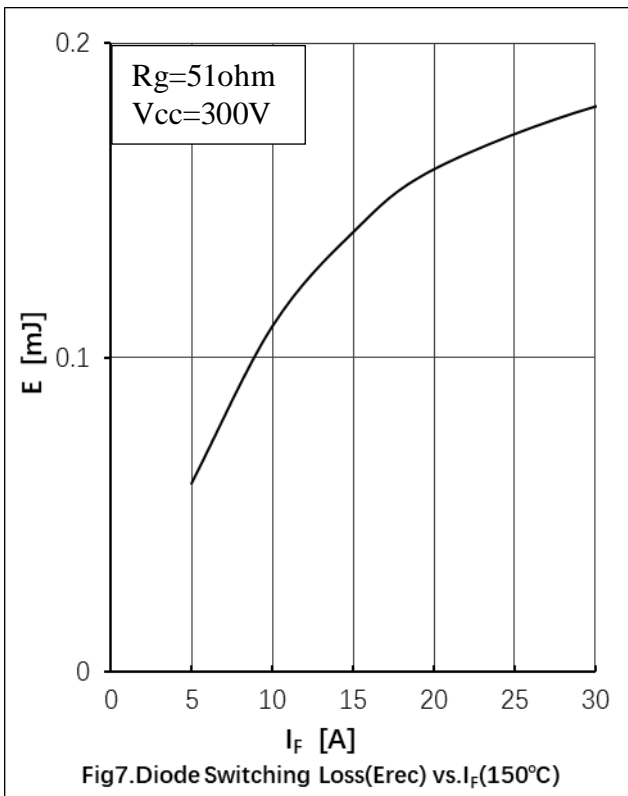
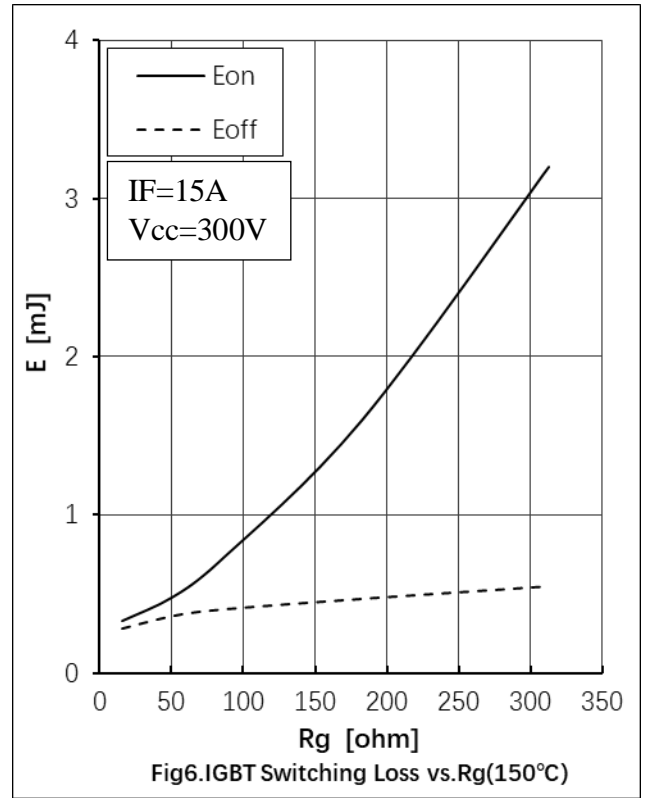
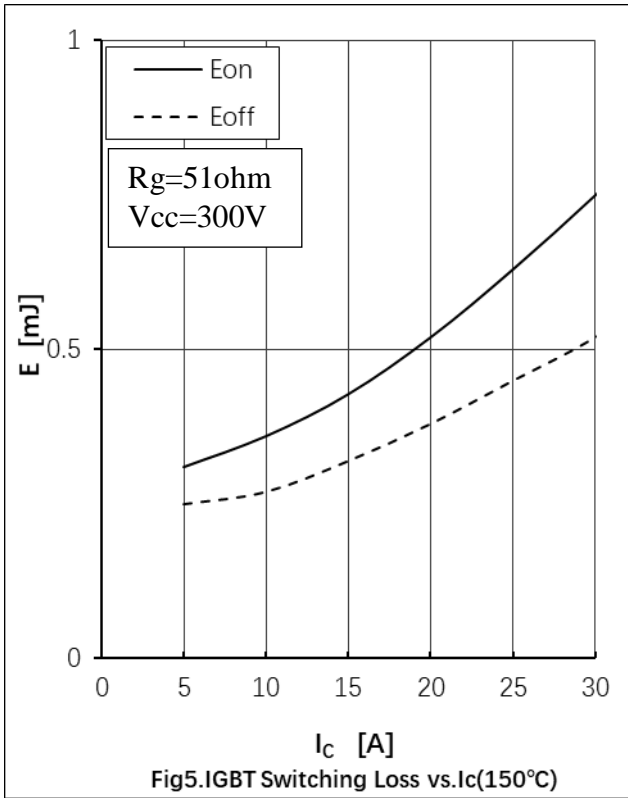
Electrical Characteristics of the DIODE

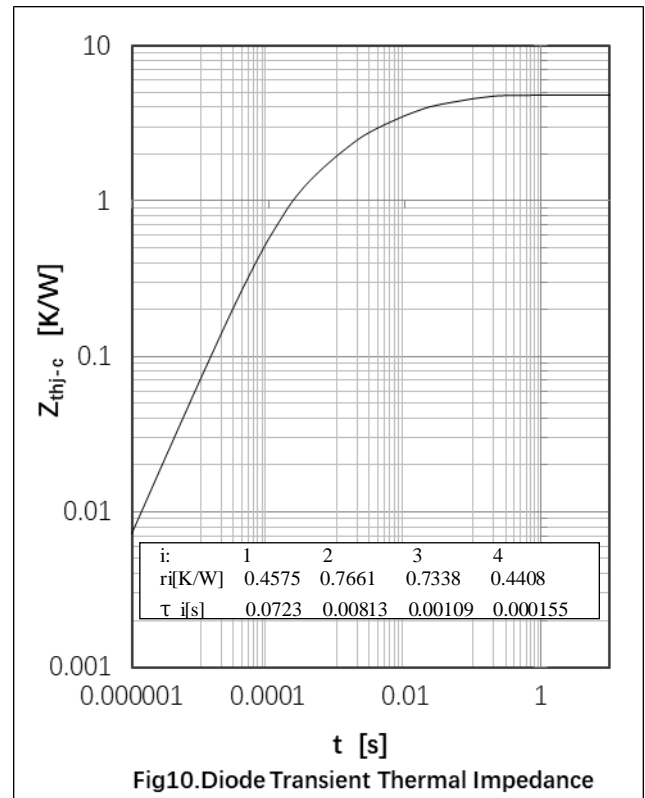
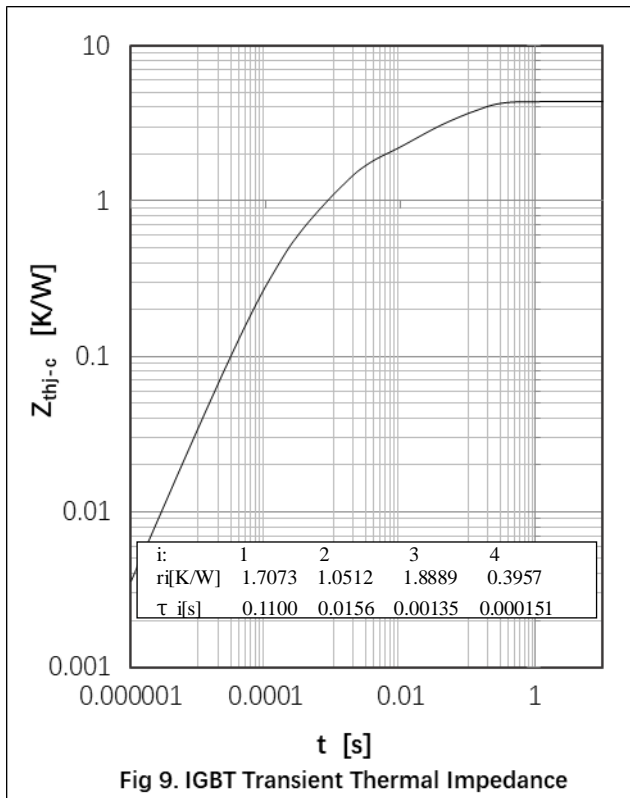
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25°C						
Reverse Recovery Current	I _{rr}	I _F =15A, V _R =300V, -di/dt= 380A/μs,	-	6	-	A
Diode reverse recovery time	trr		-	197	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.24	-	uC
Reverse Recovery Energy	E _{rec}		-	0.06	-	mJ
Dynamic , at T_j= 125°C						
Reverse Recovery Current	I _{rr}	I _F =15A, V _R =300V, -di/dt= 380A/μs,	-	7	-	A
Diode reverse recovery time	trr		-	213	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.58	-	uC
Reverse Recovery Energy	E _{rec}		-	0.11	-	mJ
Dynamic , at T_j= 150°C						
Reverse Recovery Current	I _{rr}	I _F =15A, V _R =300V, -di/dt= 380A/μs,	-	8	-	A
Diode reverse recovery time	trr		-	221	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.71	-	uC
Reverse Recovery Energy	E _{rec}		-	0.14	-	mJ

Thermal Resistance

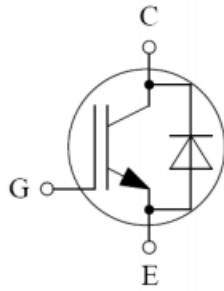
Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R _{th(j-c)}	4.4	K/W
Diode Thermal Resistance, Junction - Case	R _{th(j-c)}	4.8	K/W
Thermal Resistance, Junction - Ambient	R _{th(j-a)}	60	K/W





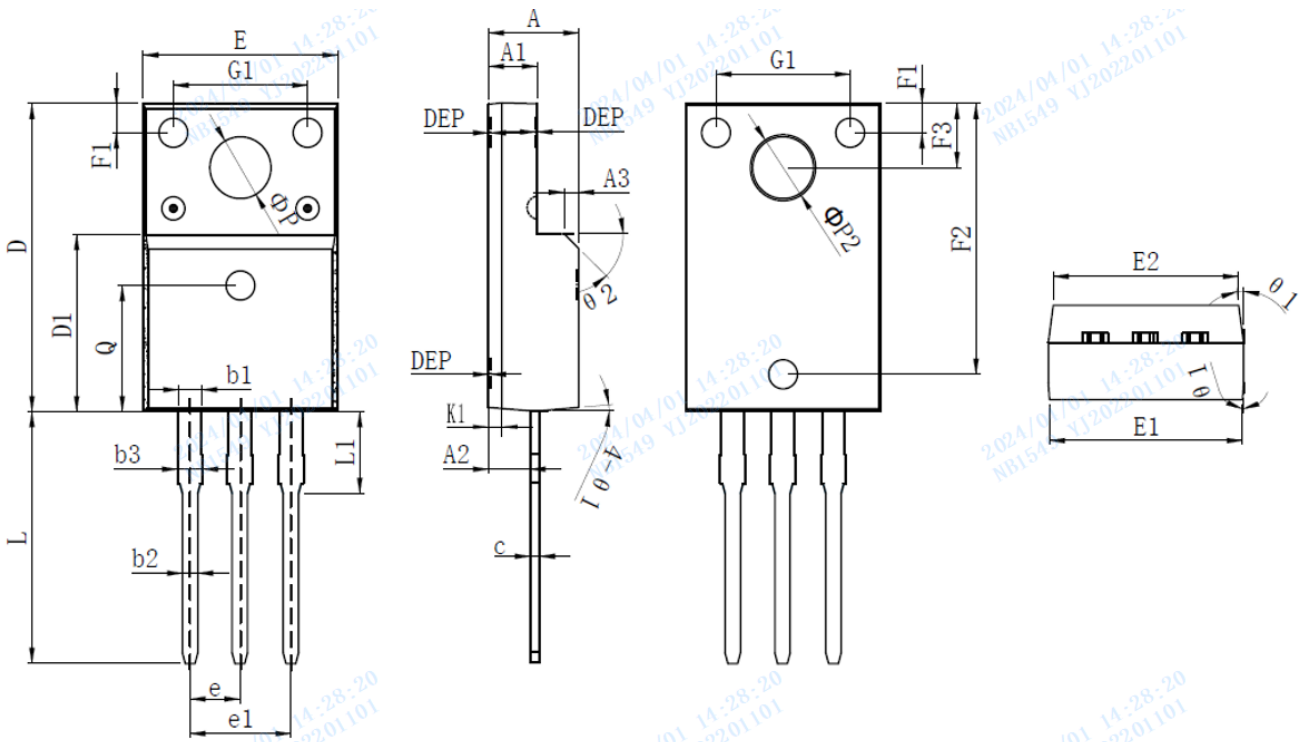


● Circuit Diagram



● 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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