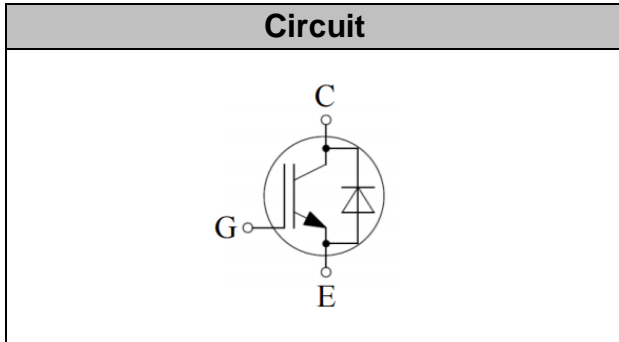


IGBT Discrete

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	30 15	A
Diode Forward Current, limited by T_{jmax} $T_C=25^\circ C$ $T_C=100^\circ C$	I_F	30 15	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}	110	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** ($T_j = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static						
Diode Forward Voltage	V_F	$I_F = 15\text{A}$ $T_j = 25^\circ\text{C}$, $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$		1.90 1.70 1.60	2.40	V

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at $T_j = 25^\circ\text{C}$						
Turn-on Delay Time	$t_{d(on)}$	$T_j = 25^\circ\text{C}$ $V_{CC} = 300\text{V}$, $I_C = 15\text{A}$, $V_{GE} = -5\text{V} \sim 15\text{V}$, $R_g = 51\ \Omega$	-	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 $T_j = 125^\circ\text{C}$						
Turn-on Delay Time	$t_{d(on)}$	$T_j = 125^\circ\text{C}$ $V_{CC} = 300\text{V}$, $I_C = 15\text{A}$, $V_{GE} = -5\text{V} \sim 15\text{V}$, $R_g = 51\ \Omega$	-	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 $T_j = 150^\circ\text{C}$						
Turn-on Delay Time	$t_{d(on)}$	$T_j = 150^\circ\text{C}$ $V_{CC} = 300\text{V}$, $I_C = 15\text{A}$, $V_{GE} = -5\text{V} \sim 15\text{V}$, $R_g = 51\ \Omega$	-	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

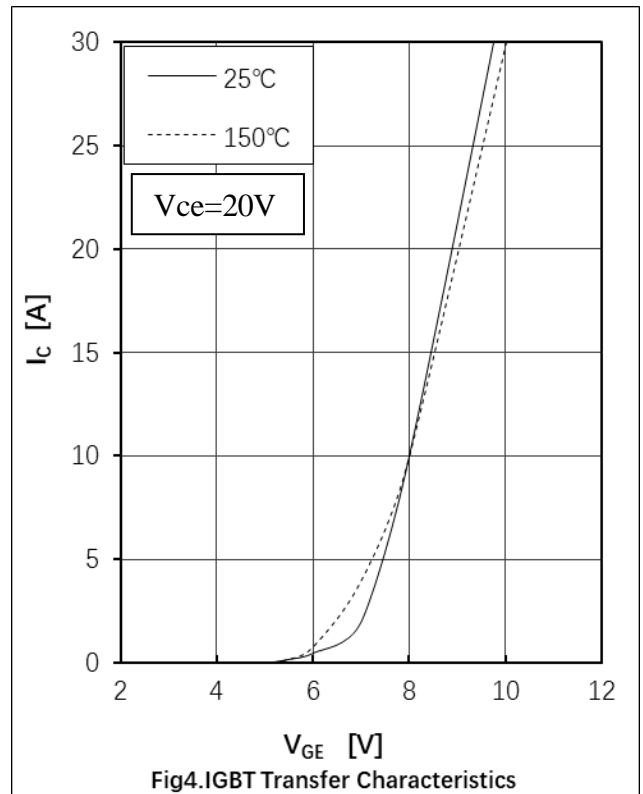
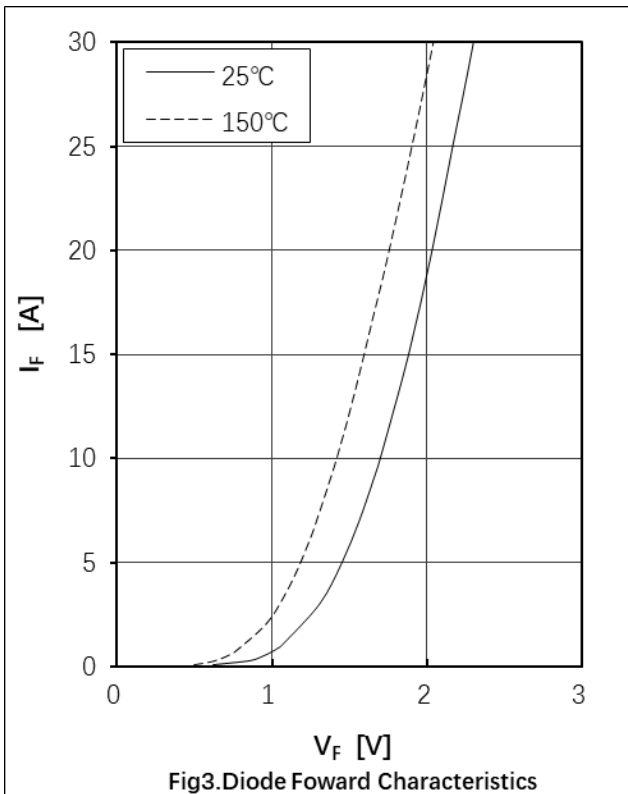
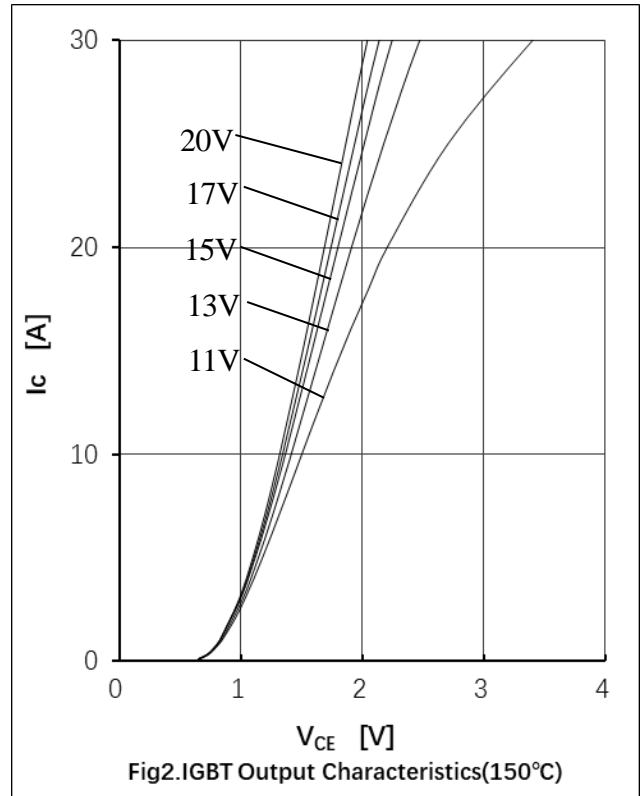
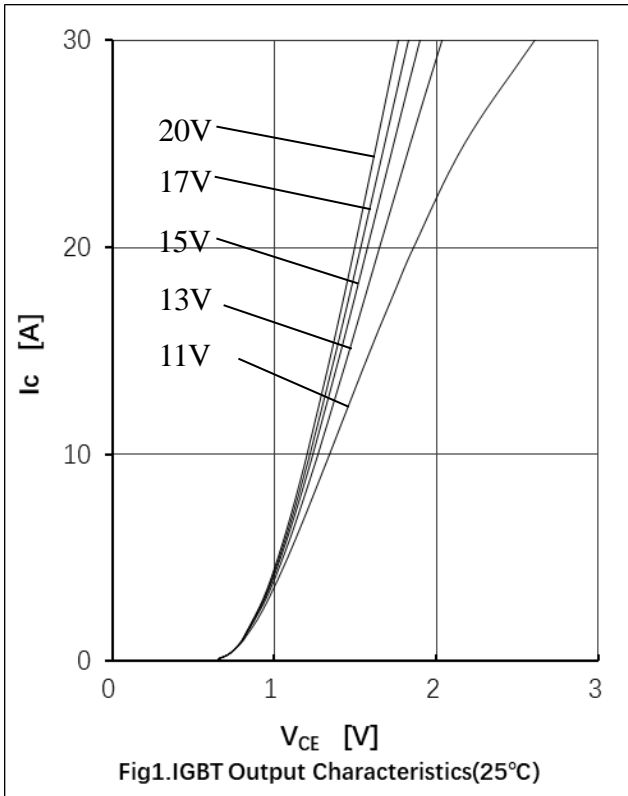


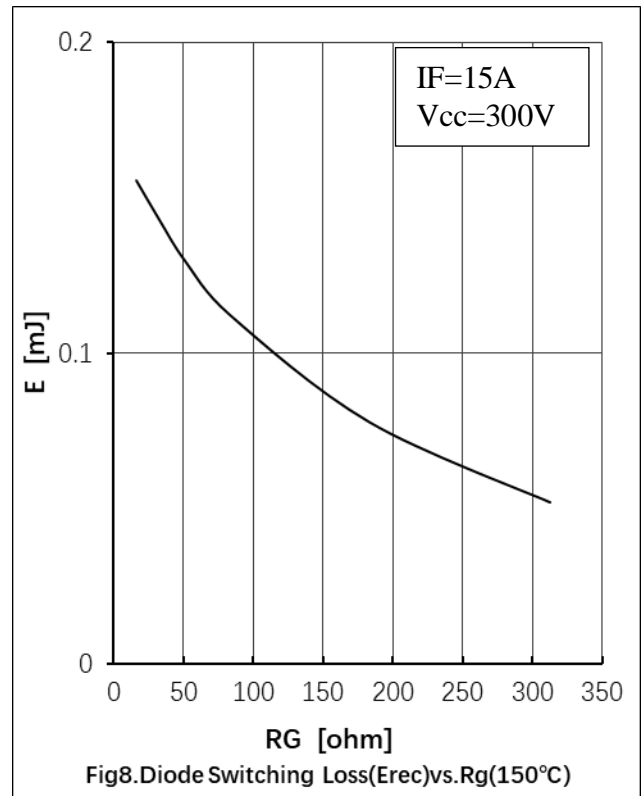
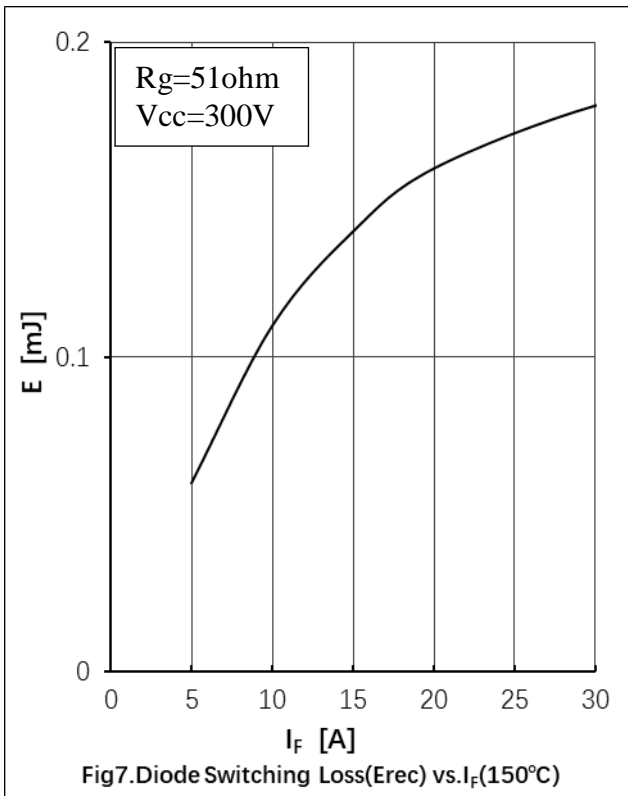
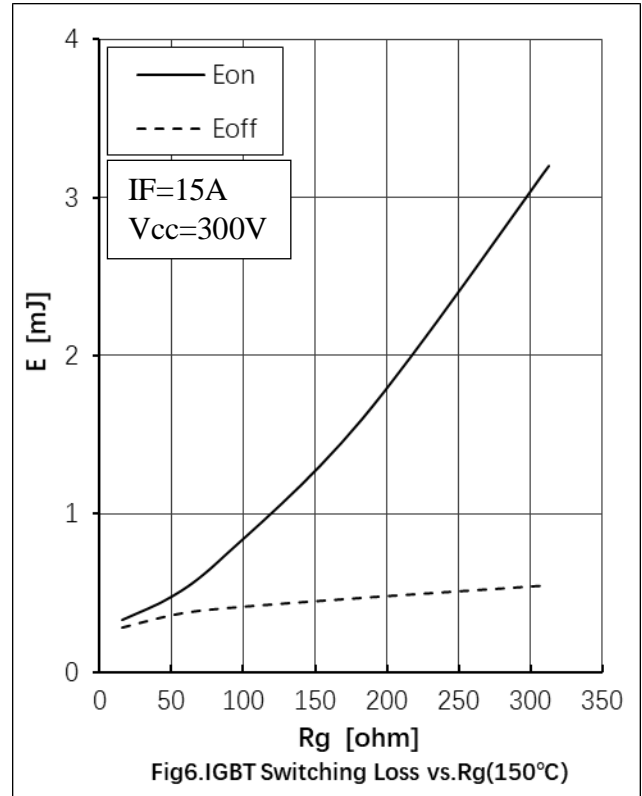
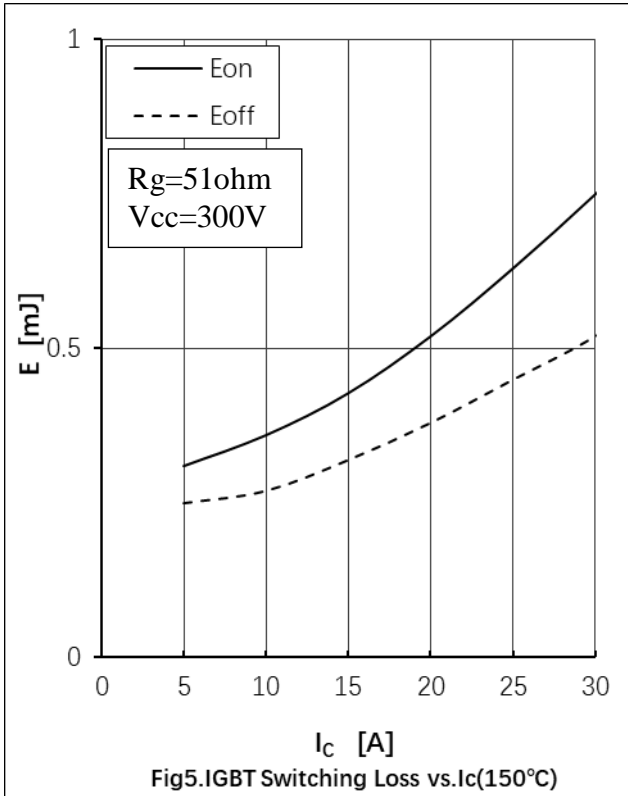
Electrical Characteristics of the DIODE

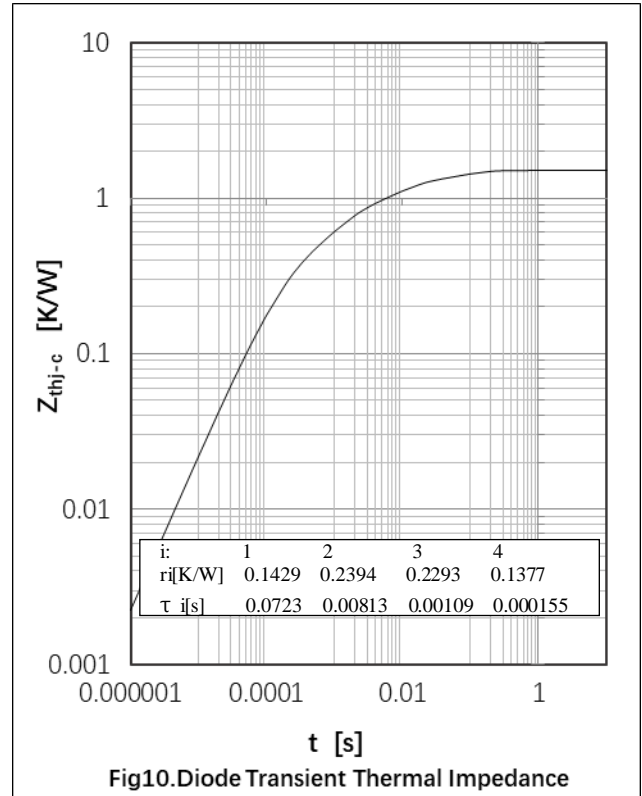
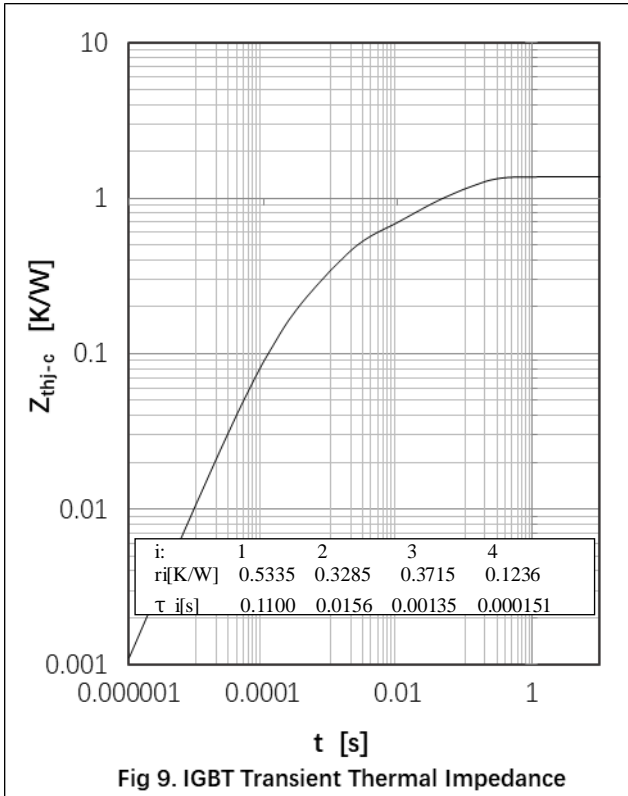
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic , at T_j= 25°C						
Reverse Recovery Current	I _{rr}	I _F =15A, V _R =300V, -di/dt= 380A/μs,	-	6	-	A
Diode reverse recovery time	trr		-	197	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.24	-	uC
Reverse Recovery Energy	E _{rec}		-	0.06	-	mJ
Dynamic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

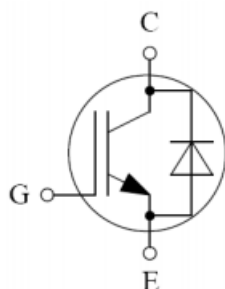
Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	R _{th(j-c)}	1.35	K/W
Diode Thermal Resistance, Junction - Case	R _{th(j-c)}	1.5	K/W
Thermal Resistance, Junction - Ambient	R _{th(j-a)}	60	K/W





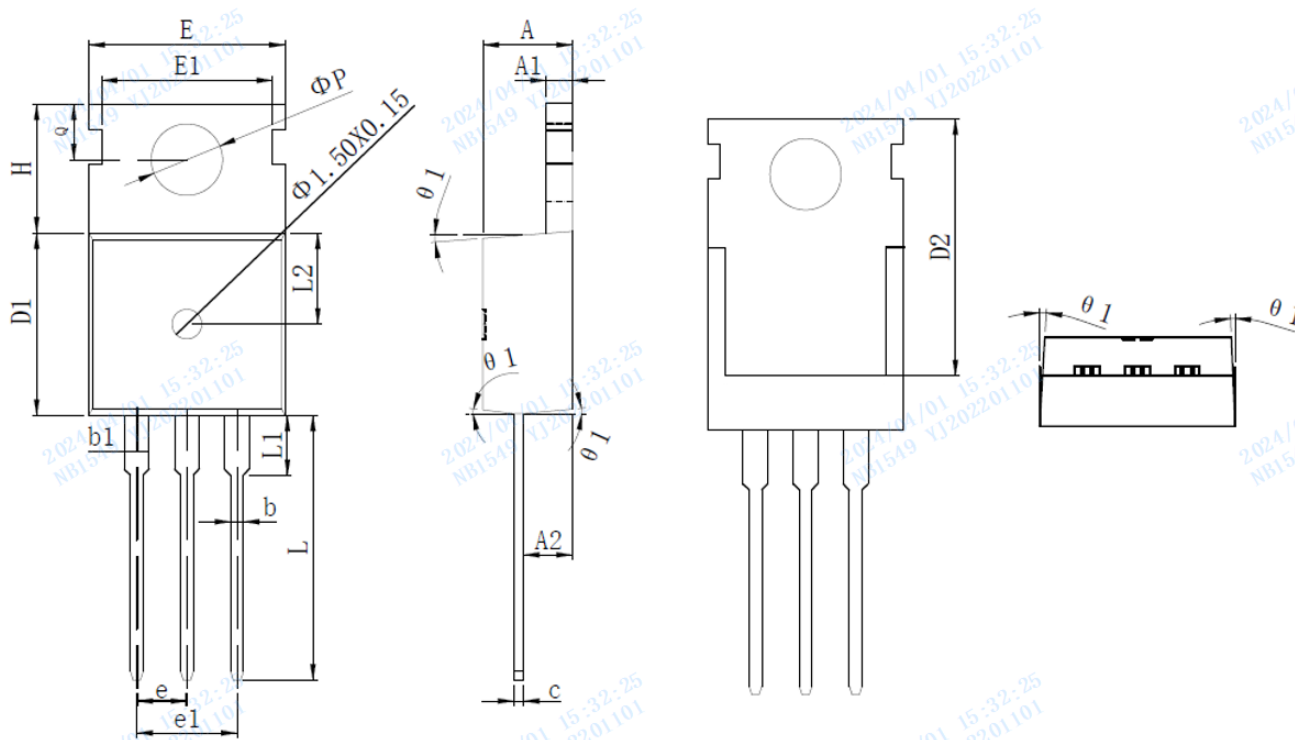


● **Circuit Diagram**



● **Package Outline Information**

CASE: TO-220 package information



SYMBOL	单位: mm			SYMBOL	单位: mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	4.40	4.50	4.60	e1	5.08REF		
A1	1.25	1.30	1.35	H	6.40	6.50	6.60
A2	2.30	2.40	2.50	L	13.00	13.28	13.45
b	0.75	0.80	0.85	L1	—	—	3.40
b1	1.25	1.33	1.42	L2	4.55	4.65	4.75
C	0.45	0.50	0.55	ΦP	3.60	3.65	3.75
D1	9.10	9.20	9.30	Q	2.70	2.80	2.90
D2	12.90	13.10	13.30	θ1	2°	—	7°
E	9.80	10.02	10.15				
E1	8.55	8.70	8.85				
e	2.50	2.54	2.58				



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