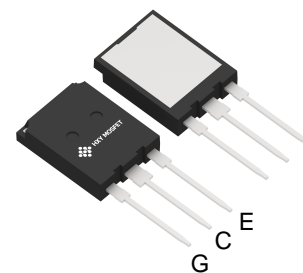
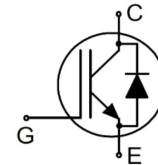




Features

- 1200V, 140A IGBT
- High Input Impedance
- Low Switching Losses
- Low Saturation Voltage $V_{CE(SAT)}$
- Copacked with Fast Recovery Diode
- Low Conduction Loss for a High Efficiency
- Rugged Transient Reliability
- Low EMI



Application

- UPS
- EV-Charging
- String solar Inverter

Key Performance and Package Parameters

Device	V_{CE}	I_C ($T_C = 25^\circ\text{C}$)	$V_{CE(SAT)}$ ($T_{VJ} = 25^\circ\text{C}$, $V_{GE} = 15\text{V}$)	V_F ($T_{VJ} = 25^\circ\text{C}$, $I_F = 40\text{A}$)	Package	Packing
IKQ140N120CH7XKSA1	1200V	140A	1.55V	2.01V	TO-247P	30PCS

Absolute Maximum Ratings (@ $T_{VJ} = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Value	Units
V_{CE}	Collector emitter voltage		1200	V
I_C	DC collector current ⁽¹⁾	$T_C = 25^\circ\text{C}$	240	A
		$T_C = 100^\circ\text{C}$	140	A
I_{CM}	Pulsed collector current	$T_C = 25^\circ\text{C}$	560	A
I_F	Maximum Diode forward current ⁽¹⁾	$T_C = 25^\circ\text{C}$	240	A
		$T_C = 100^\circ\text{C}$	140	A
I_{FM}	Diode pulsed current	$T_C = 25^\circ\text{C}$	560	A
V_{GE}	Gate-Emitter voltage	$T_{VJ} = 25^\circ\text{C}$	± 20	V
P_{tot}	Power Dissipation	$T_C = 25^\circ\text{C}$	1091	W
		$T_C = 100^\circ\text{C}$	545	W
T_{VJ}	Operating Junction Temperature Range		-40 to +175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-55 to +150	$^\circ\text{C}$



Thermal Resistance

Symbol	Parameter	Conditions	Typ	Unit
$R_{\theta JC}$	IGBT Thermal resistance: junction - case	IGBT	0.11	°C/W
$R_{\theta JC}$	Diode Thermal resistance: junction - case	Diode	0.17	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{(BR)CES}	Collector - Emitter Breakdown Voltage	V _{GE} = 0V , I _C = 0.5mA	1200	-	-	V
V _{CESAT}	Collector - Emitter Saturation Voltage	V _{GE} = 15V , I _C = 140A	-	1.55	-	V
		V _{GE} = 15V , I _C = 140A ,T _{VJ} = 175°C	-	1.81	-	V
V _F	Diode forward voltage	V _{GE} = 0V , I _C = 140A	-	2.01	-	V
		V _{GE} = 0V , I _C = 140A ,T _{VJ} = 175°C	-	2.19	-	V
V _{GE(th)}	Gate-Emitter threshold voltage	V _{GE} = V _{CE} , I _C = 2.24mA	-	5.17	-	V
I _{CES}	Zero Gate voltage Collector current	V _{CE} = 1200V , V _{GE} = 0V	-	-	40.0	μA
I _{GES}	Gate-Emitter leakage current	V _{GE} = ±20V , V _{CE} = 0V	-	-	±100	nA
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{GE} = 0V, V _{CE} = 25V, f = 100k Hz	-	16191	-	pF
C _{oes}	Output Capacitance		-	407	-	pF
C _{res}	Reverse Transfer Capacitance		-	59.4	-	pF
R _G	Gate input resistance	f = 1M Hz	-	0.8	-	Ω
Q _g	Gate Charge	V _{GE} = 0 to 15V V _{CE} = 960V, I _C = 140A	-	473	-	nC
Q _{ge}	Gate to Emitter charge		-	122	-	nC
Q _{gc}	Gate to Collector charge		-	112	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	Tvj = 25 °C V _{CC} = 600 V, I _C =140 A V _{GE} = 0 / 15 V R _{G(on)} = 10 Ω, R _{G(off)} = 10 Ω	-	183	-	ns
t _r	Turn-On Rise Time		-	241	-	ns
t _{d(off)}	Turn-Off DelayTime		-	359	-	ns
t _f	Turn-Off Fall Time		-	221	-	ns
E _{on}	Turn-on energy		-	11.9	-	mJ
E _{off}	Turn-off energy		-	8.9	-	mJ
E _{ts}	Total switching energy		-	20.8	-	mJ
t _{d(on)}	Turn-On DelayTime	Tvj = 175 °C V _{CC} = 600 V, I _C =140 A V _{GE} = 0 / 15 V R _{G(on)} = 10 Ω, R _{G(off)} = 10 Ω	-	165	-	ns
t _r	Turn-On Rise Time		-	262	-	ns
t _{d(off)}	Turn-Off DelayTime		-	395	-	ns
t _f	Turn-Off Fall Time		-	274	-	ns
E _{on}	Turn-on energy		-	12.8	-	mJ
E _{off}	Turn-off energy		-	10.1	-	mJ
E _{ts}	Total switching energy		-	22.9	-	mJ



Diode Recovery Characteristics

T_{rr}	Reverse recovery time	$T_{vj} = 25\text{ }^{\circ}\text{C}$ $V_{CC} = 600\text{ V}, I_C = 140\text{ A}$ $V_{GE} = 0 / 15\text{ V}$ $R_{G(on)} = 10\text{ }\Omega, R_{G(off)} = 10\text{ }\Omega$	-	137	-	ns
Q_{rr}	Reverse recovery charge		-	0.81	-	μC
I_{rrm}	Peak reverse recovery current		-	9.3	-	A
E_{rec}	Reverse recovery energy		-	9.3	-	mJ
T_{rr}	Reverse recovery time	$T_{vj} = 175\text{ }^{\circ}\text{C}$ $V_{CC} = 600\text{ V}, I_C = 140\text{ A}$ $V_{GE} = 0 / 15\text{ V}$ $R_{G(on)} = 10\text{ }\Omega, R_{G(off)} = 10\text{ }\Omega$	-	511	-	ns
Q_{rr}	Reverse recovery charge		-	5.4	-	μC
I_{rrm}	Peak reverse recovery current		-	17.5	-	A
E_{rec}	Reverse recovery energy		-	1.6	-	mJ

Notes: 1. Limited by bondwire



Typical Performance Characteristics

Fig.1 Output characteristics (25°C)

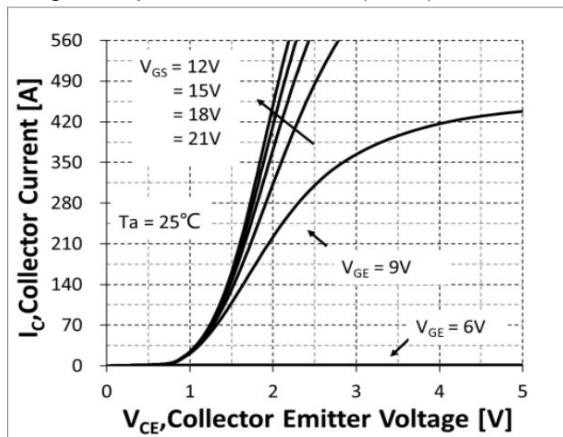


Fig.2 Output characteristics (175°C)

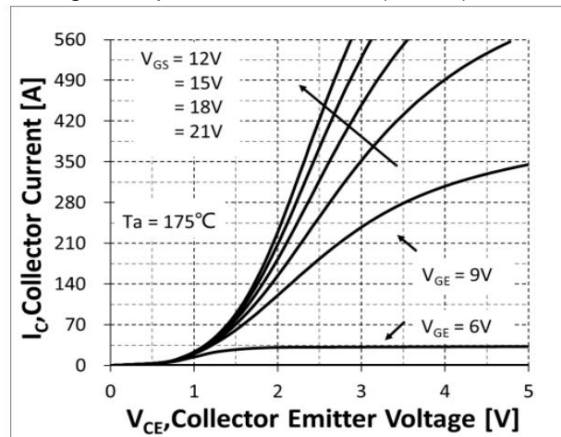


Fig.3 Safe operating area

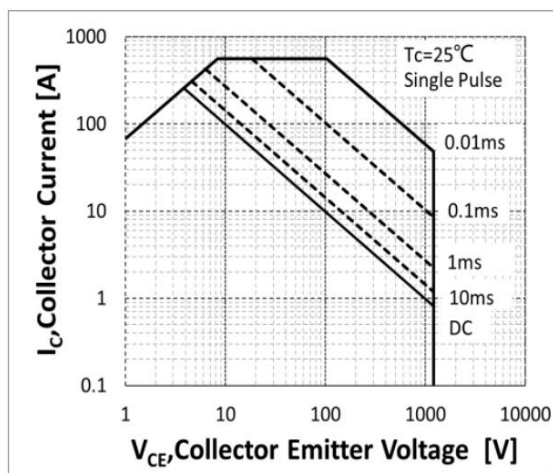


Fig.4 Transfer characteristics

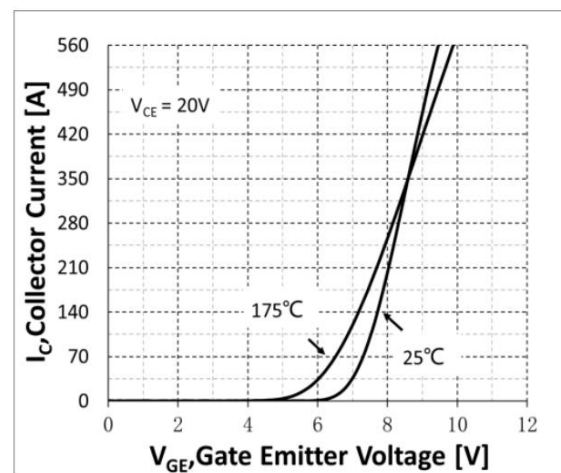


Fig.5 Gate charge

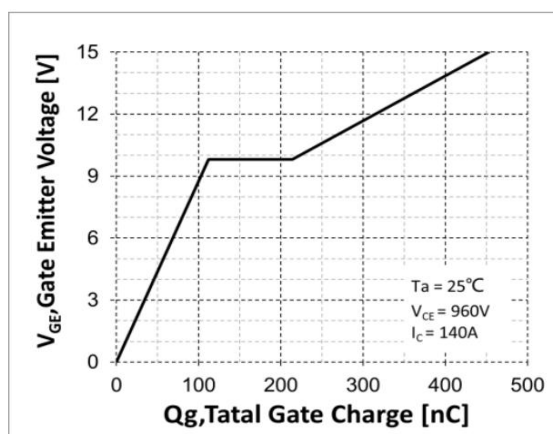


Fig.6 Typical capacitance

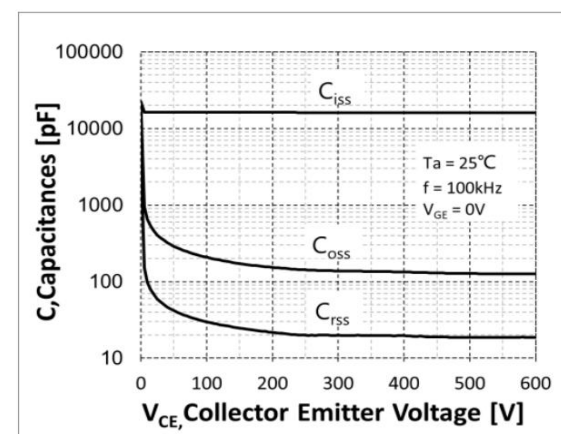




Fig.7 Switching Times vs. Gate Resistance

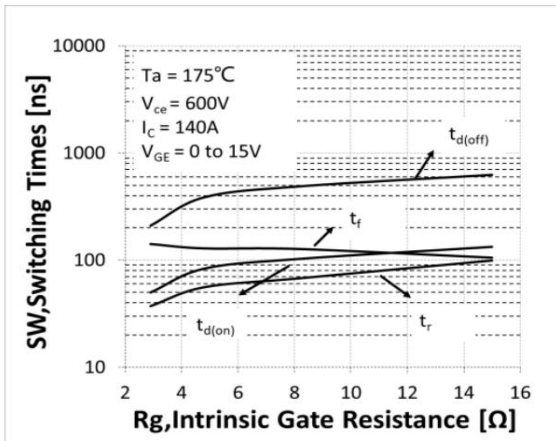


Fig.8 Switching Times vs. Junction Temperature

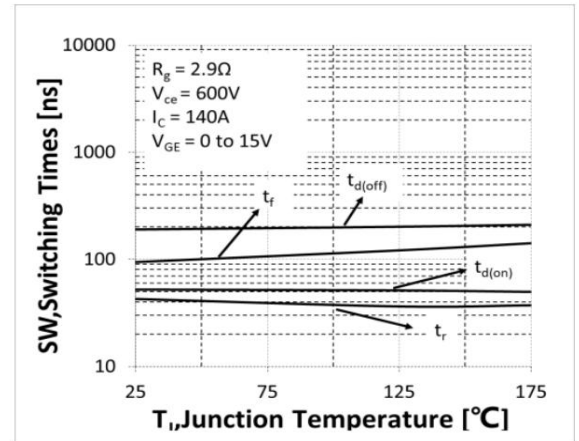


Fig.9 Switching Times vs. Collector Current

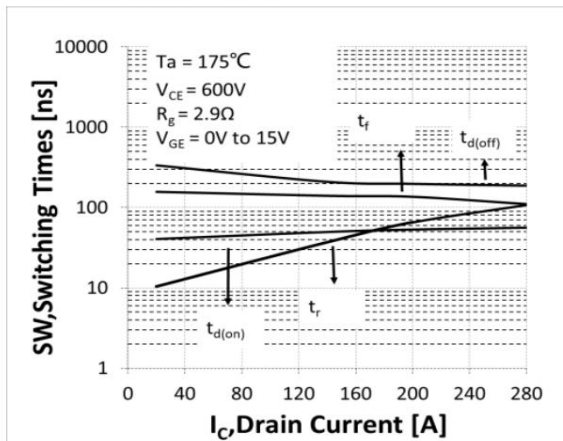


Fig.10 Switching Energy vs. Gate Resistance

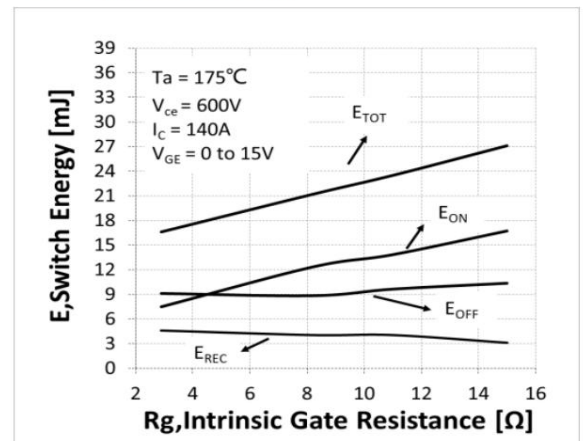


Fig.11 Switching Energy vs. Junction Temperature

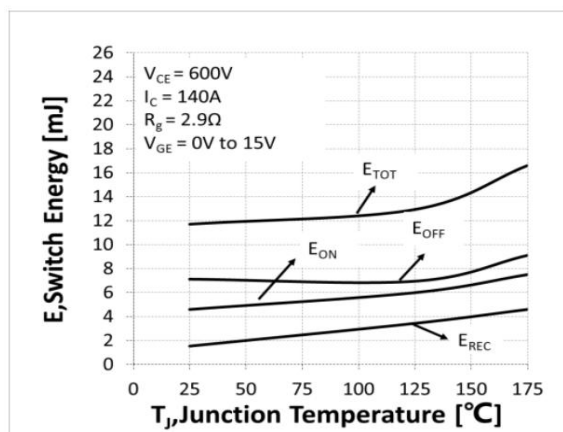


Fig.12 Switching Energy vs. Collector Current

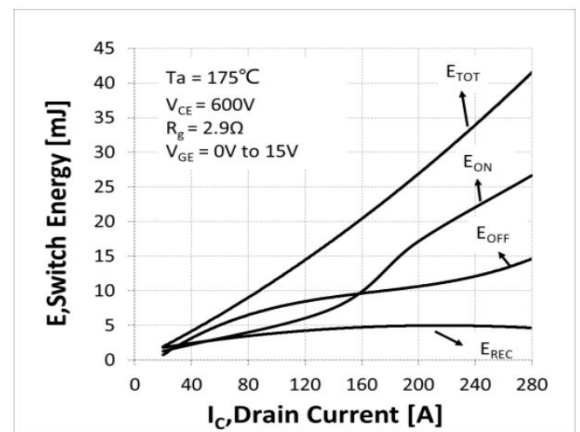




Fig.13 Switching Energy vs. Collector Emitter Voltage

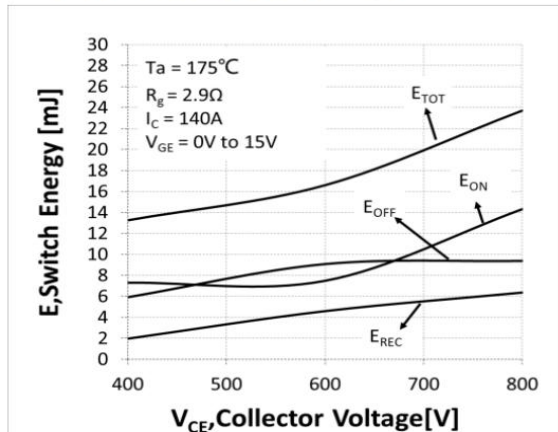


Fig.14 Saturation Voltage vs. Junction Temperature

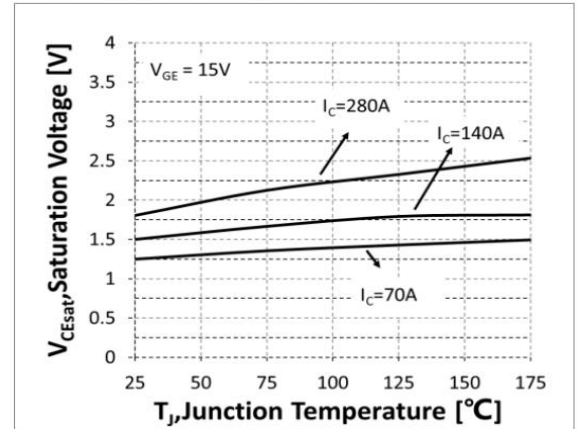


Fig.15 Gate Voltage vs. Junction Temperature

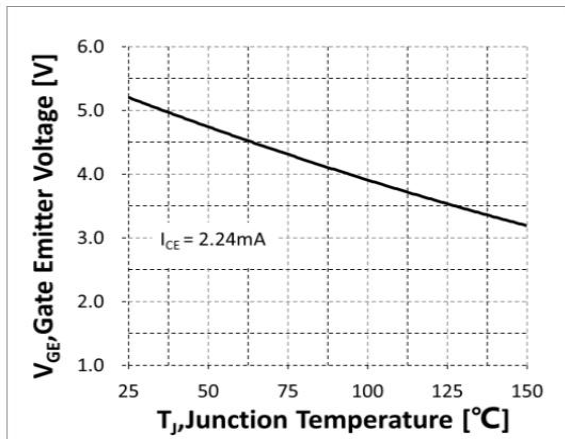


Fig.16 Body Diode Forward Voltage vs. Forward Current

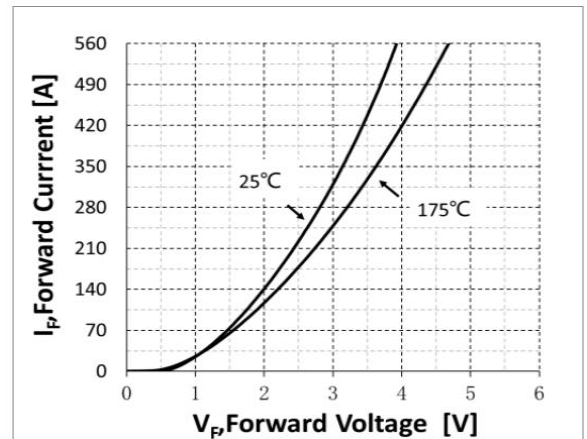


Fig.17 Thermal characteristics (IGBT)

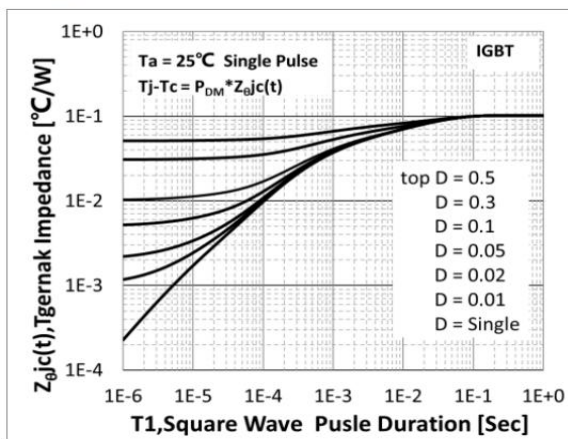
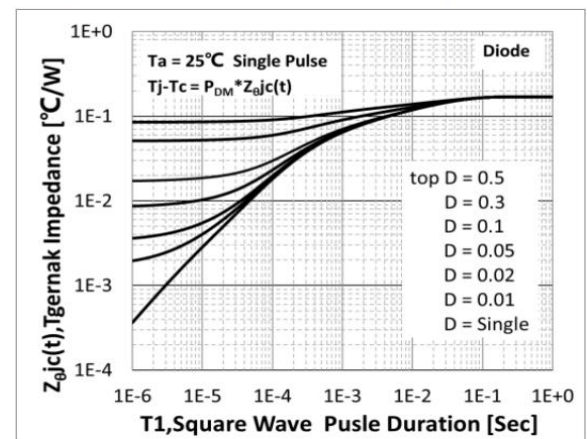
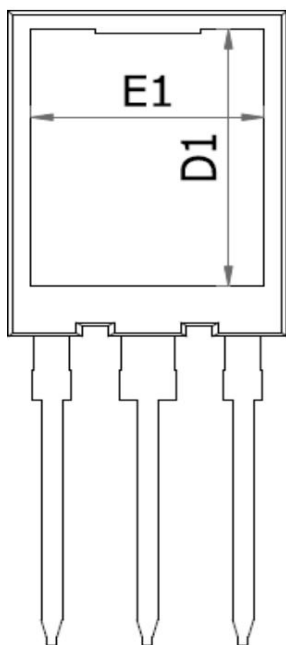
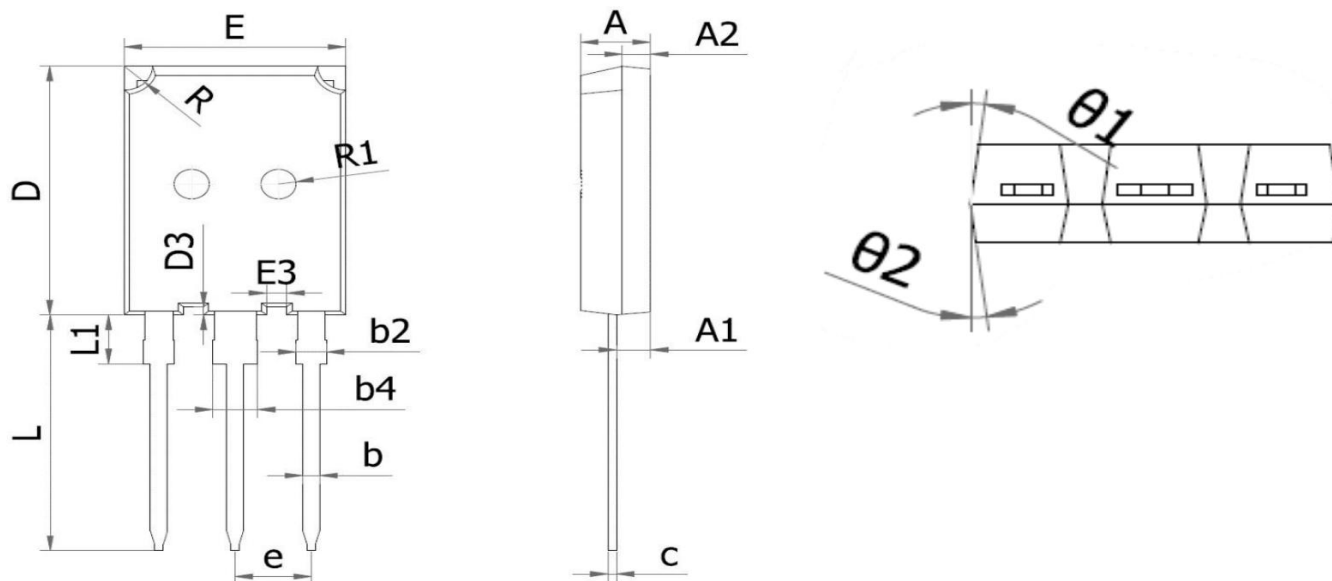


Fig.18 Thermal characteristics (Diode)





Package Mechanical Data(TO-247P)



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.23	2.43	2.63
A2	1.85	2.00	2.15
b	1.10	1.20	1.30
b2	1.90	2.10	2.20
b4	2.90	3.10	3.20
c	0.50	0.60	0.70
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
D3	0.53	0.68	0.83
E	15.50	15.80	16.10
E1	13.05	13.25	13.45
E3	1.30	1.45	1.60
e	5.44 BSC		
L	19.62	19.92	20.22
L1	---	---	4.30
R	1.85	2.00	2.15
R1	1.10	1.25	1.40
θ1	5°	7°	9°
θ2	5°	7°	9°



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