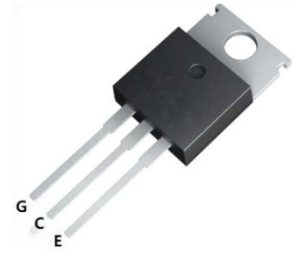
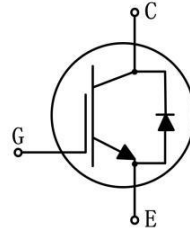


Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	650	V
I_C	20	A
$V_{CE(sat)}$	1.5	V



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Features

- Maximum junction temperature: $T_{vj}=150^{\circ}C$
- Low $V_{CE(sat)}$
- Very tight parameter distribution
- Low switching losses
- Easy parallel switching capability due to positive temperature coefficient in $V_{CE(sat)}$

Applications

- Soft switching applications
- Air conditioning
- Motor drive inverter

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	650	V
DC Collector current, limited by T_{vjmax} $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	I_C	40 20	A
Pulsed Collector current, t_p limited by T_{vjmax}	I_{Cpuls}	60	A
Diode forward current, limited by T_{vjmax} $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	I_F	20 10	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	60	A
Gate-Emitter voltage	V_{GES}	± 20	V
Power dissipation ($T_C=25^{\circ}C$) Power dissipation ($T_C=100^{\circ}C$)	P_{tot}	111 44	W
Operating junction temperature	T_{vj}	-55 to +150	$^{\circ}C$
Storage temperature	T_{stg}	-55 to +150	$^{\circ}C$
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	$^{\circ}C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
IGBT thermal resistance, junction-to-case	$R_{\theta JC}$	1.13	$^{\circ}C/W$
Diode thermal resistance, junction-to-case	$R_{\theta JC}$	1.7	$^{\circ}C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	40	$^{\circ}C/W$

Electrical Characteristics (T_{vj}=25°C unless otherwise noted)
Static characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter breakdown voltage	V _{(BR)CES}	V _{GE} =0V, I _C =250μA	650	-	-	V
Collector-Emitter saturation voltage	V _{CE(sat)}	V _{GE} =15V, I _C =20A T _{vj} =25°C T _{vj} =150°C	- -	1.5 1.9	2.0 -	V
Diode forward voltage	V _F	V _{GE} =0V, I _F =20A T _{vj} =25°C T _{vj} =150°C	- -	1.65 1.50	- -	V
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} =V _{GE} , I _C =250μA	4.0	5.25	7.0	V
Collector cut-off current	I _{CES}	V _{CE} =650V, V _{GE} =0V	-	-	5	μA
Gate-Emitter leakage current, Forward	I _{GES}	V _{GE} =±20V, V _{CE} =0V	-	-	±200	nA

Dynamic characteristics

Parameter	Symbol	Test Condition	Value			Unit	
			Min.	Typ.	Max.		
Input capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1MHz	-	1019.6	-	pF	
Output capacitance	C _{oes}		-	55.6	-		
Reverse transfer capacitance	C _{res}		-	7.88	-		
Turn-on delay time	t _{d(on)}	V _{CC} =400V, I _C =20A, V _{GE} =0V/15V, R _G =10Ω T _{vj} =25°C	-	34.4	-	ns	
Rise time	t _r		-	20.7	-		
Turn-off delay time	t _{d(off)}		-	83.5	-		
Fall time	t _f		-	41.6	-		
Turn-on energy	E _{on}		-	0.5	-		mJ
Turn-off energy	E _{off}		-	0.25	-		
Total switching energy	E _{ts}	-	0.75	-			
Total Gate charge	Q _G	V _{CC} =520V, I _C =20A, V _{GE} =15V	-	42.4	-	nC	
Gate to Emitter charge	Q _{GE}		-	7.8	-		
Gate to Collector charge	Q _{GC}		-	19.4	-		

Reverse diode characteristics

Parameter	Symbol	Test condition	Values			Unit
			Min.	Typ.	Max.	
Diode reverse recovery time	t _{rr}	T _{vj} =25°C	-	76	-	ns
Diode reverse recovery charge	Q _{rr}	V _R =400V, I _F =20A, di _F /d _t =1000A/μs	-	0.65	-	μC
Diode peak reverse recovery current	I _{rrm}		-	21	-	A

Typical Characteristics

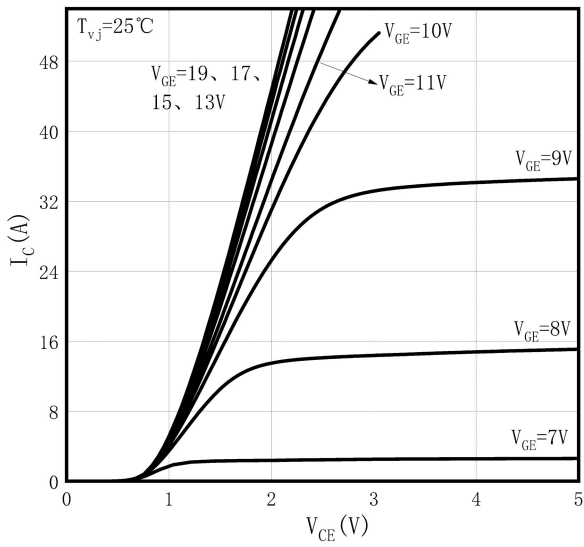


Fig1. Output Characteristic ($T_{vj}=25^\circ\text{C}$)

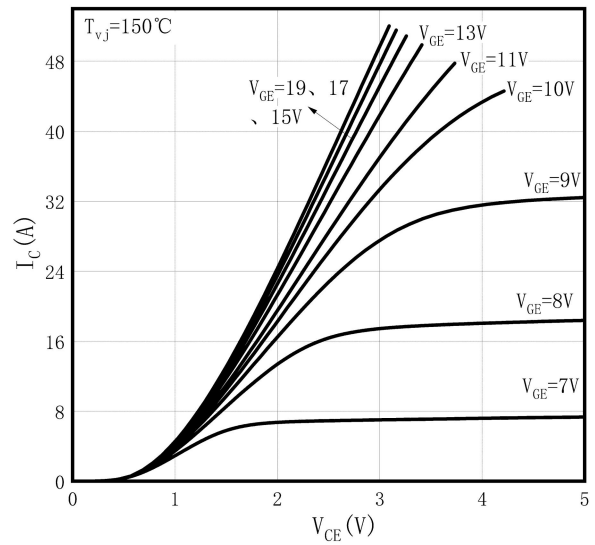


Fig2. Output Characteristic ($T_{vj}=150^\circ\text{C}$)

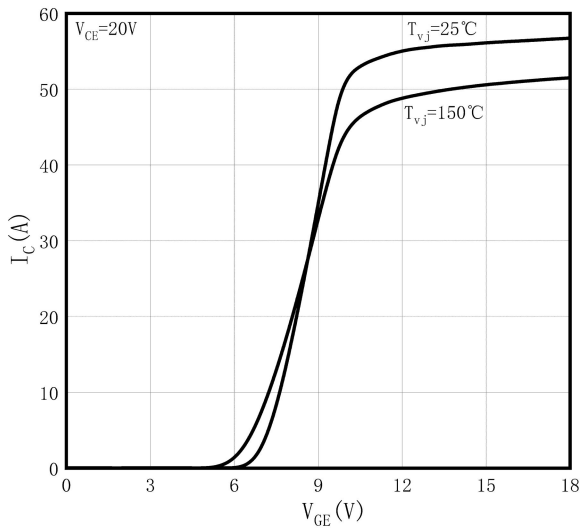


Fig3. Typical Transfer Characteristic

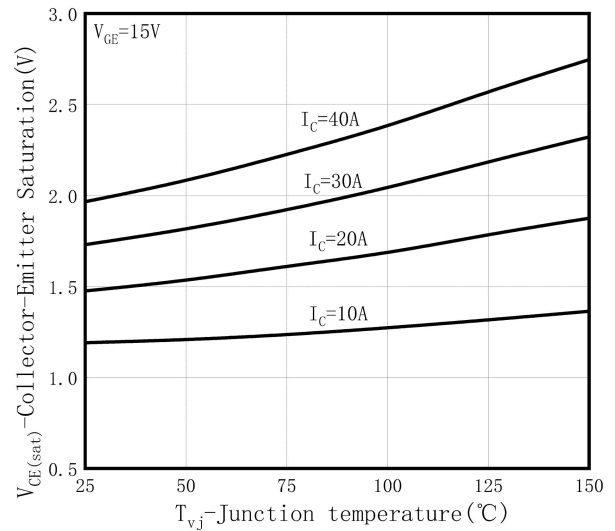


Fig4. $V_{CE(sat)}$ & T_{vj}

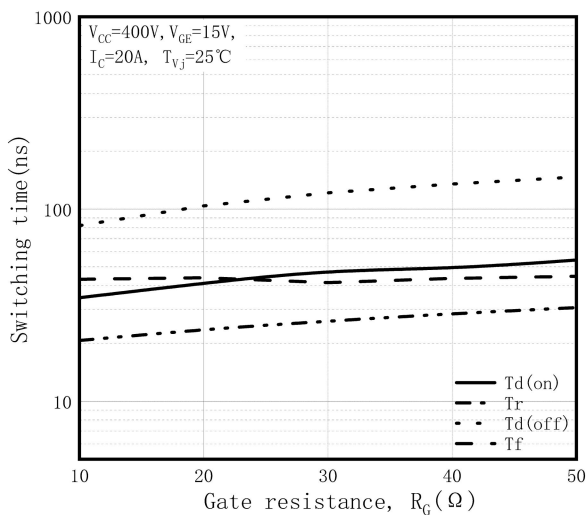


Fig5. Switching Times & Gate Resistance

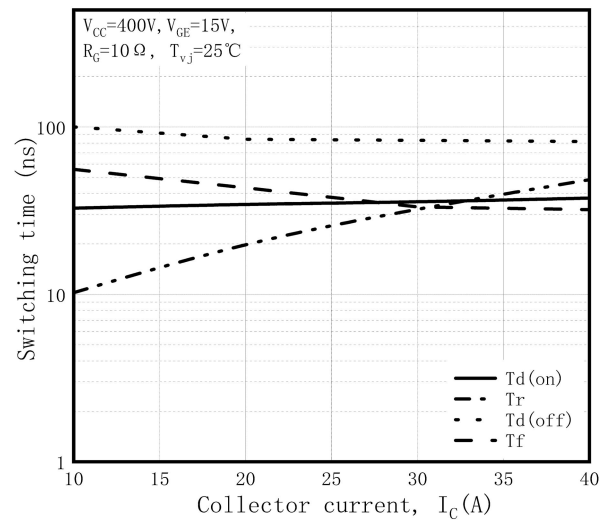


Fig6. Switching Times & Collector Current

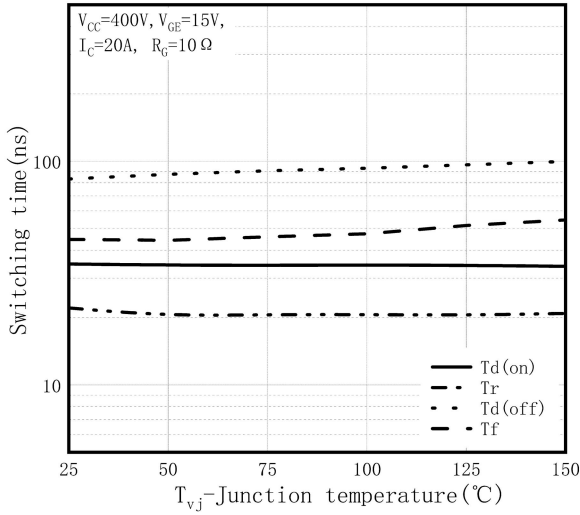


Fig7. Switching Times & T_{vj}

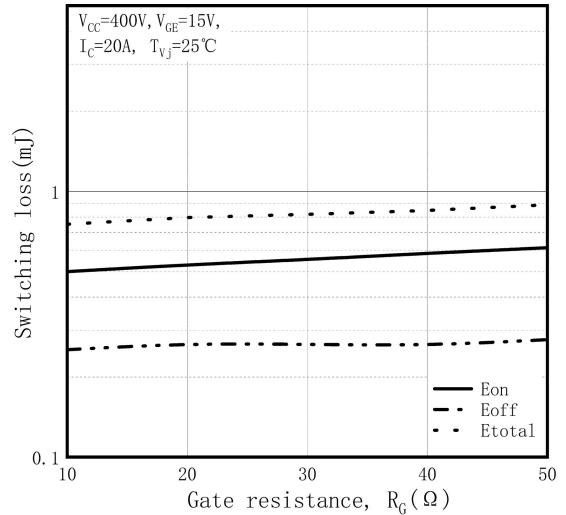


Fig8. Switching Loss & Gate Resistance

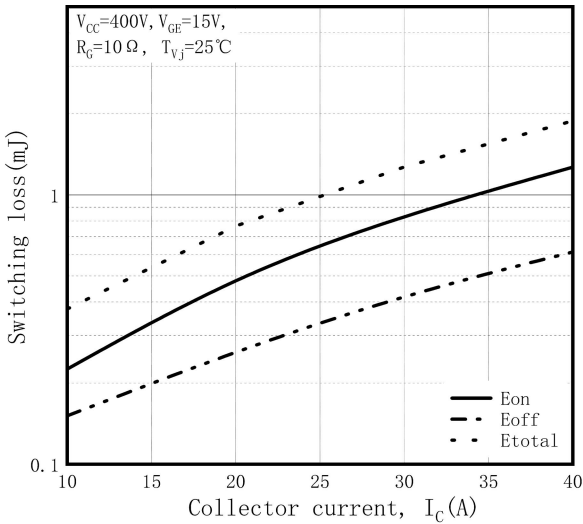


Fig9. Switching Loss & Collector Current

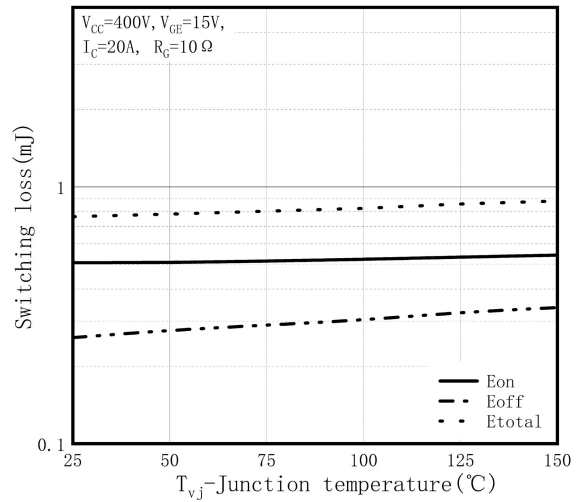


Fig10. Switching Loss & T_{vj}

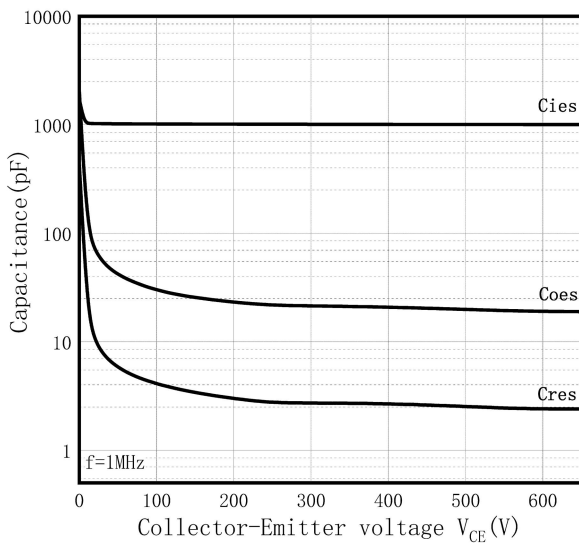


Fig11. Capacitance Characteristic

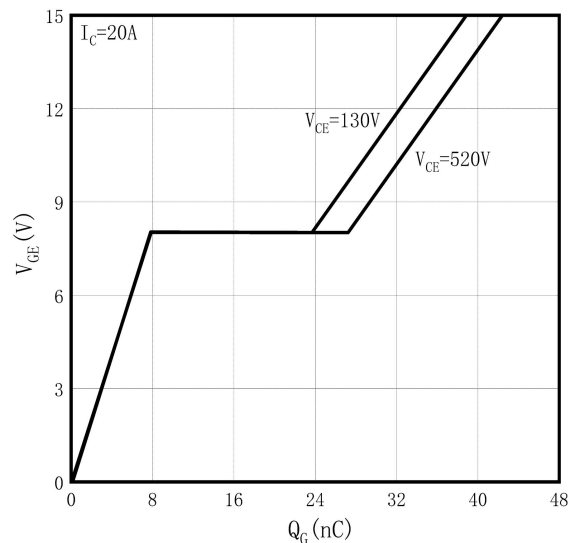


Fig12. Typical Gate Charge

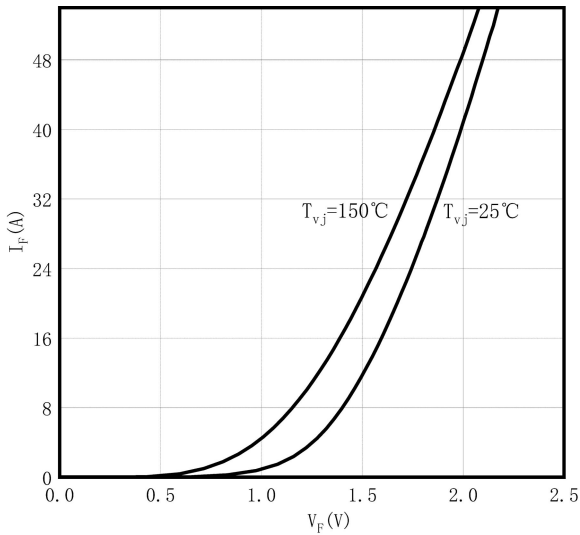


Fig13. Diode Characteristic

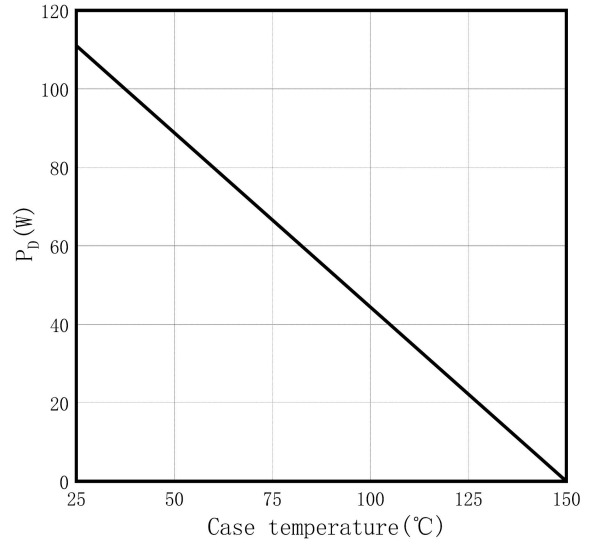


Fig14. Power Dissipation Characteristic

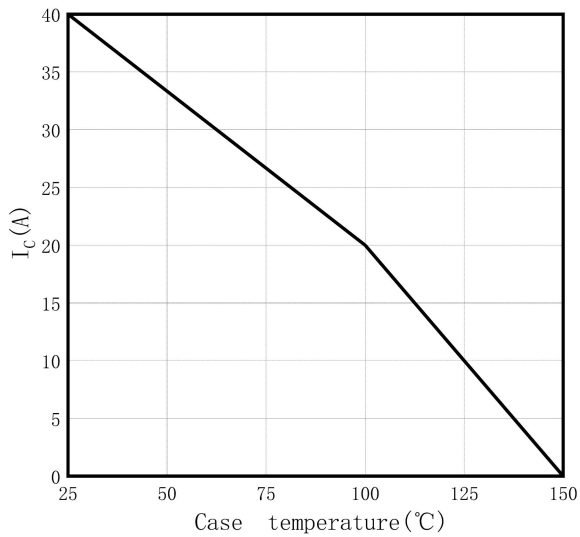


Fig15. I_c & T_c

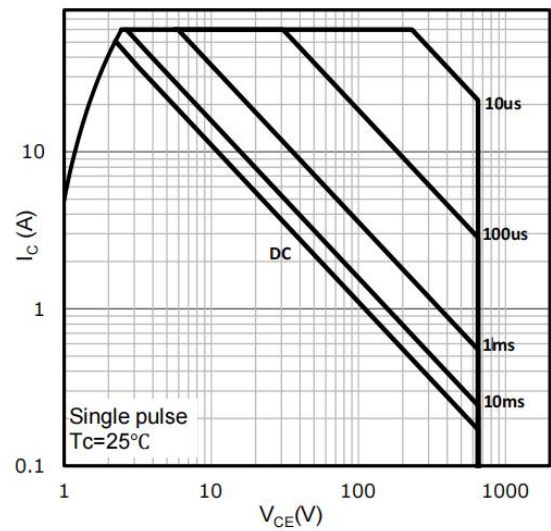


Fig16. Safe Operating Area

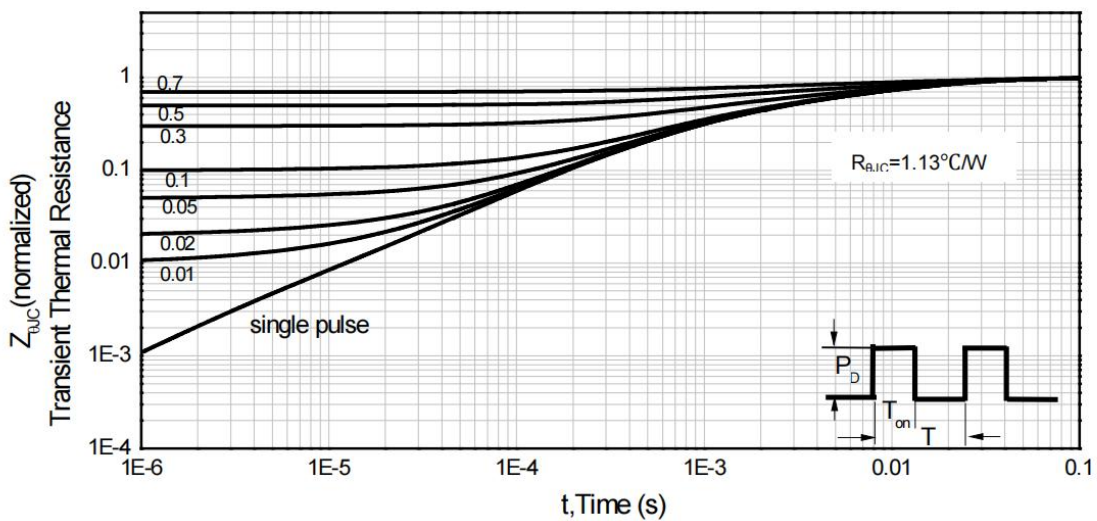
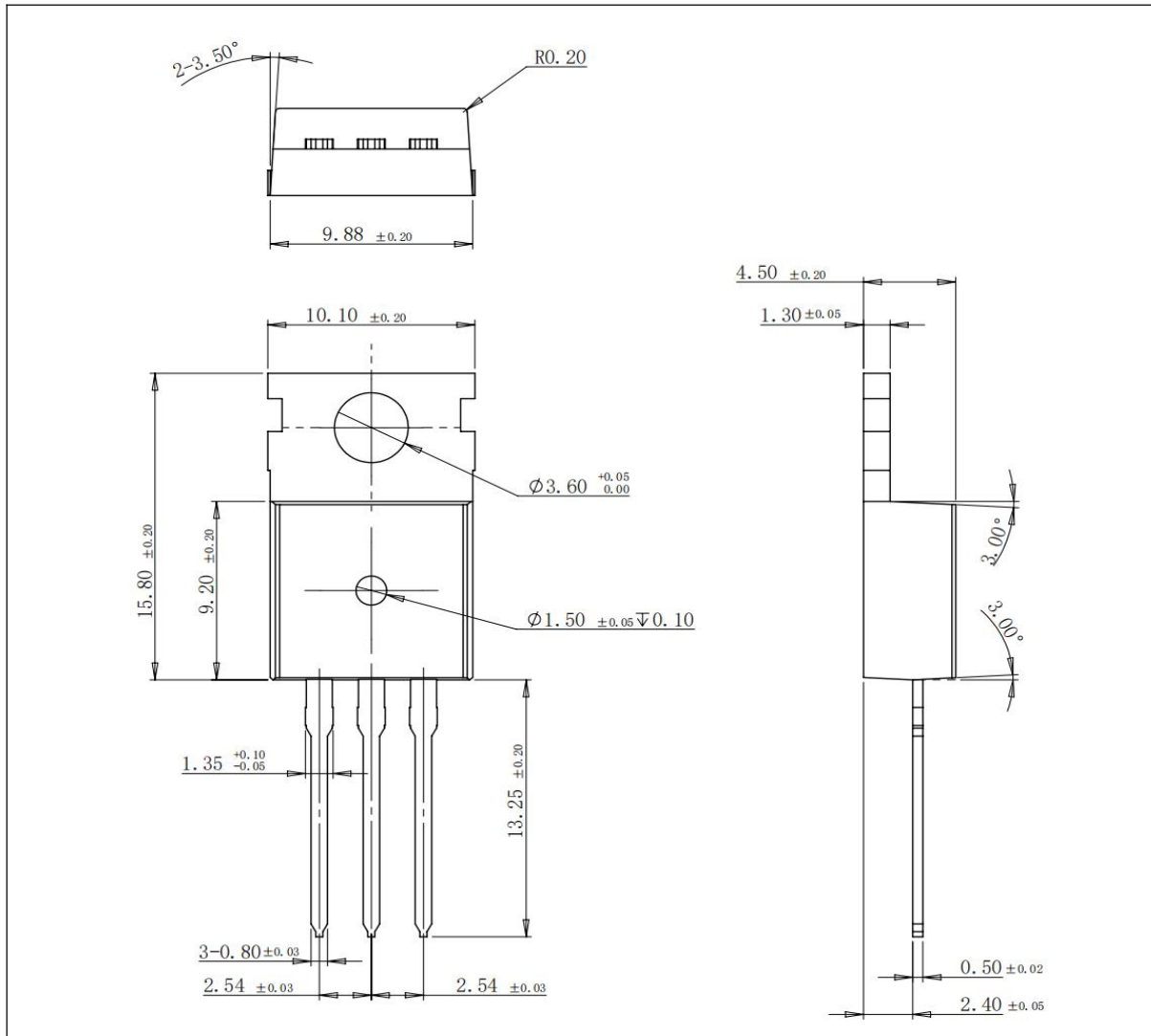


Fig17. Normalized Maximum Transient Thermal Impedance (R_{thjC})

Package Outlines (Unit: mm)

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