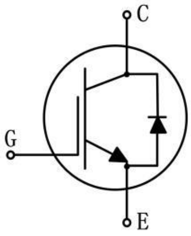
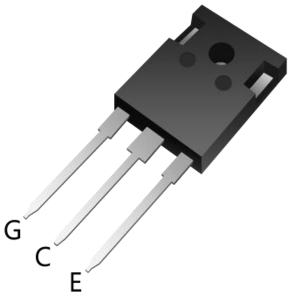
Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	1200	V
I_C	15	A
$V_{CE(sat)}$	1.7	V





TO-247-3L

Features

- Trench and field-stop technology
- Low collector to emitter saturation voltage
- Easy parallel switching capability
- Short circuit withstands time 7μs
- High ruggedness performance

Applications

- Inverters
- Motor drives

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CES}	1200	V
Gate-emitter voltage	V_{GES}	±20	V
Continuous collector current(T_C=25℃)	I_C	30	A
Continuous collector current(T_C=100℃)		15	A
Pulsed collector current,tp limited by T_{vjmax}	I_{CM}	60	A
Diode continuous forward current(T_C=100℃)	I_F	15	A
Diode maximum current,tp limited by T_{vjmax}	I_{FM}	60	A
Short circuit withstand time	t_{sc}	10	μs
Power dissipation(T_C=25℃)	P_{tot}	250	W
Power dissipation(T_C=100℃)		125	
Operating junction temperature range	T_{vj}	-40 to+175	℃
Storage temperature range	T_{stg}	-55 to+150	℃

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction to case for IGBT	$R_{th(j-c)}$	0.6	℃/W
Thermal resistance, junction to case for Diode	$R_{th(j-c)}$	1.2	℃/W
Thermal resistance, junction to ambient	$R_{th(j-a)}$	40	℃/W

Electrical Characteristics of IGBT(T_{vj}=25℃ unless otherwise specified)

Static characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Collector-emitter breakdown voltage	B_{VCES}	V_{GE}=0V,I_C=250μA	1200	-	-	V
Collector-emitter leakage current	I_{CES}	V_{CE}=1200V,V_{GE}=0V	-	-	250	μA
Gate leakage current,forward	I_{GES}	V_{GE}=±20V,V_{CE}=0V	-	-	±100	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE},I_C=1mA(T_J=25℃)	5.7	6.2	6.5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V,I_C=15A(T_J=25℃)	-	1.7	-	V
		V_{GE}=15V,I_C=15A(T_J=25℃)	-	2.2	-	V
Input capacitance	C_{ies}	V_{CE}=25V V_{GE}=0V f=1MHz	-	1250	-	nF
Output capacitance	C_{oes}		-	58	-	pF
Reverse transfer capacitance	C_{res}		-	13	-	pF
Total gate charge	Q_g	V_{CC}=960V V_{GE}=15V I_C=15A	-	68	-	nC

Switching Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Turn-on delay time	$t_{d(on)}$	V_{CC}=600V V_{GE}=15V I_C=15A R_G=10Ω Inductive load	-	22	-	ns
Rise time	t_r		-	34	-	ns
Turn-off delay time	$t_{d(off)}$		-	140	-	ns
Fall time	t_f		-	90	-	ns
Turn-on energy	E_{on}		-	0.9	-	mJ
Turn-off energy	E_{off}		-	0.7	-	mJ
Total switching energy	E_{ts}		-	1.6	-	mJ
Turn-on delay time	$t_{d(on)}$	V_{CC}=600V V_{GE}=15V I_C=15A R_G=10Ω Inductive load T_{vj}=175℃	-	22	-	ns
Rise time	t_r		-	38	-	ns
Turn-off delay time	$t_{d(off)}$		-	166	-	ns
Fall time	t_f		-	146	-	ns
Turn-on energy	E_{on}		-	1.1	-	mJ
Turn-off energy	E_{off}		-	1.0	-	mJ
Total switching energy	E_{ts}		-	2.1	-	mJ

Diode Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Diode forward voltage	V_F	I_F=15A,T_{vj}=25℃	-	2.3	-	V
		I_F=15A,T_{vj}=175℃	-	1.9	-	V
Diode reverse recovery time	t_{rr}	V_R=600V I_F=15A diF/dt=-250A/μs	-	223	-	ns
Diode peak reverse recovery current	I_{rrm}		-	8	-	A
Diode reverse recovery charge	Q_{rr}		-	718	-	nC
Diode reverse recovery time	t_{rr}	V_R=600V I_F=15A diF/dt=-250A/μs T_{vj}=175℃	-	396	-	ns
Diode peak reverse recovery current	I_{rrm}		-	11	-	A
Diode reverse recovery charge	Q_{rr}		-	1700	-	nC

Typical Characteristics

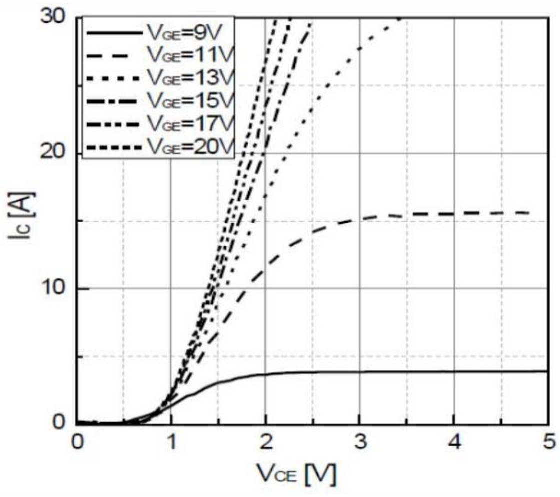


Figure 1.Typical output characteristic(T_{vj}=25℃)

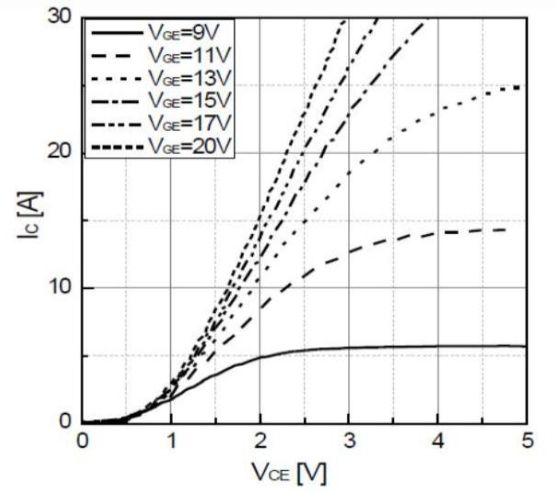


Figure 2.Typical output characteristic(T_{vj}=175℃)

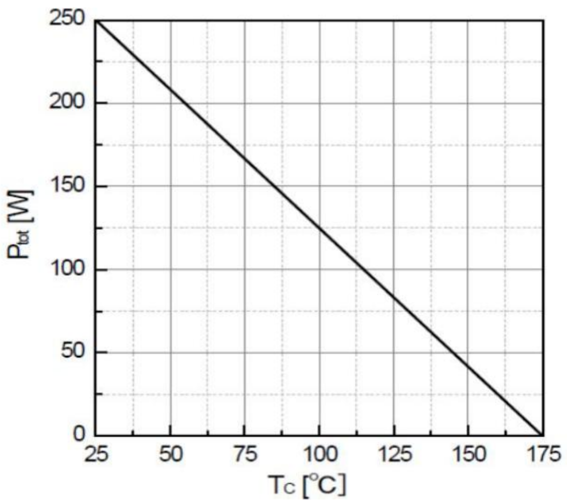


Figure 3.Power dissipation as a function of T_C

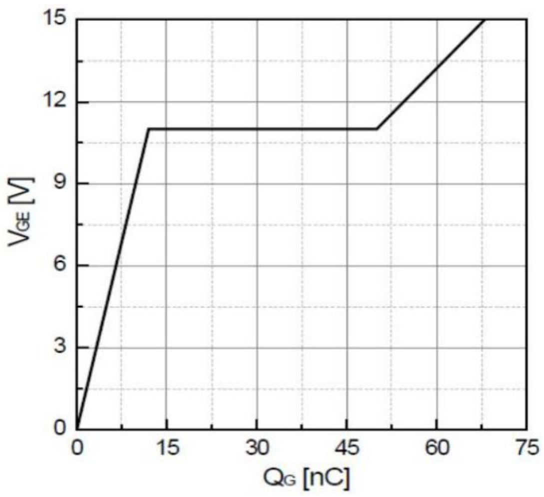


Figure 4.Typical Gate charge

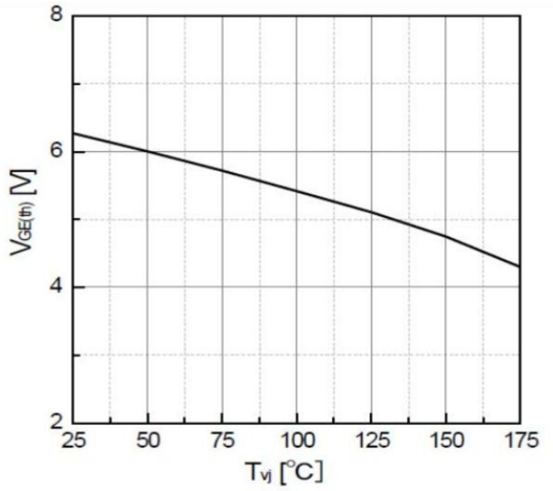


Figure 5.Typical $V_{GE(th)}$ as a function of T_{vj}(I_C=1mA)

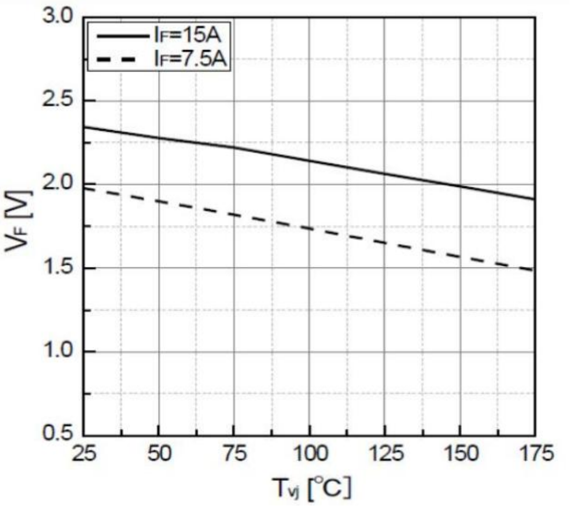


Figure 6.Typical V_F as a function of T_{vj}

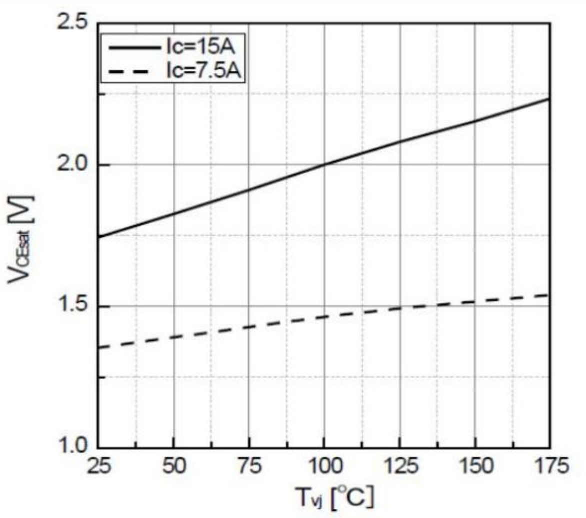


Figure 7.Typical V_{GEsat} as a function of T_{vj}

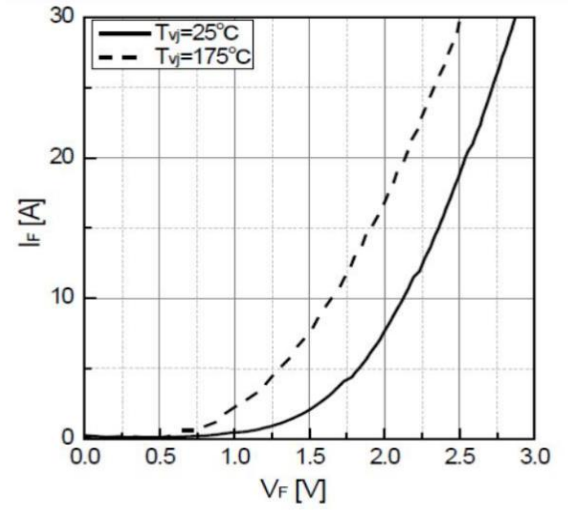


Figure 8.Typical I_F as a function of V_F

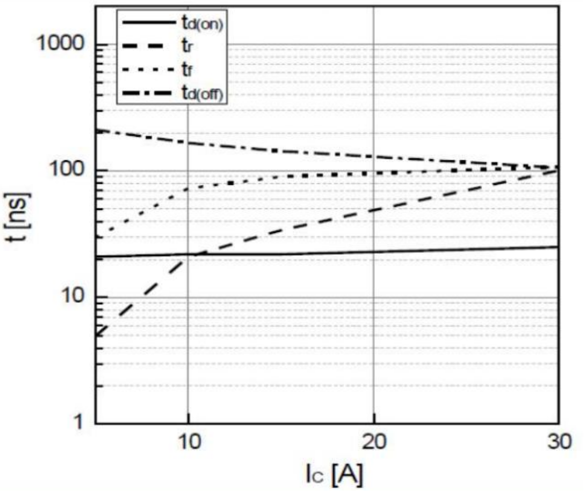


Figure 9.Typical switching time as a function of I_C

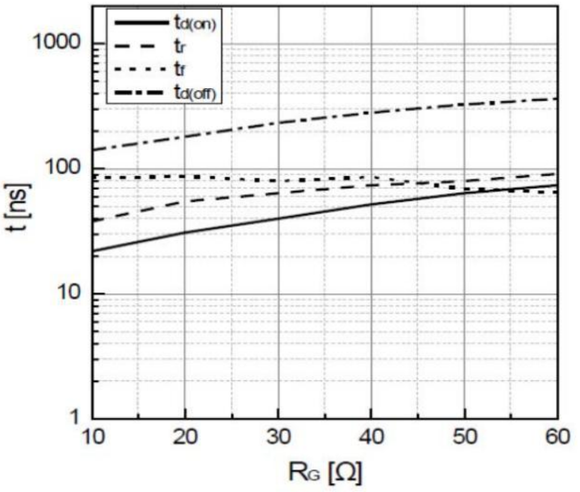


Figure 10.Typical switching times as a function of R_G

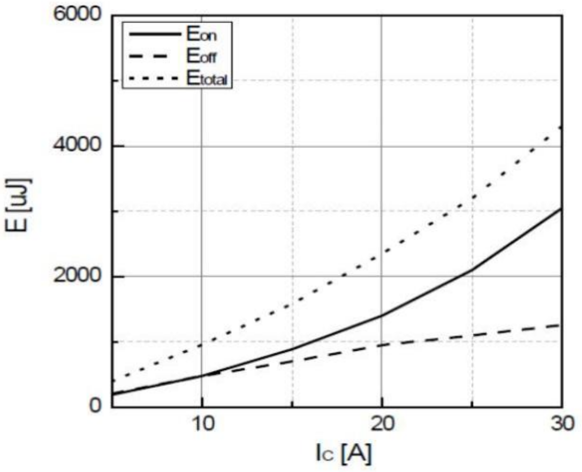


Figure 11.Typical switching energy losses as a function of I_C

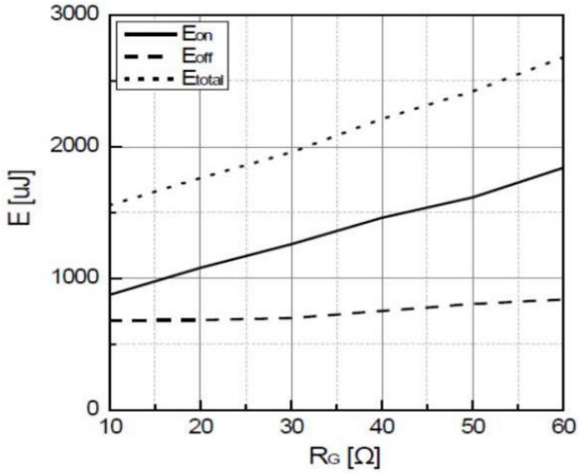


Figure 12.Typical switching energy losses as a function of R_G

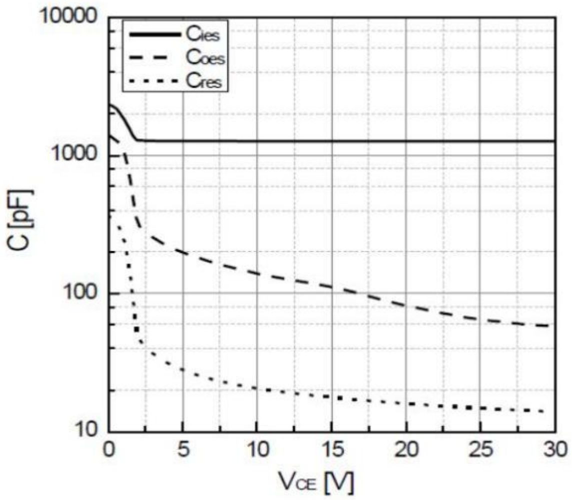
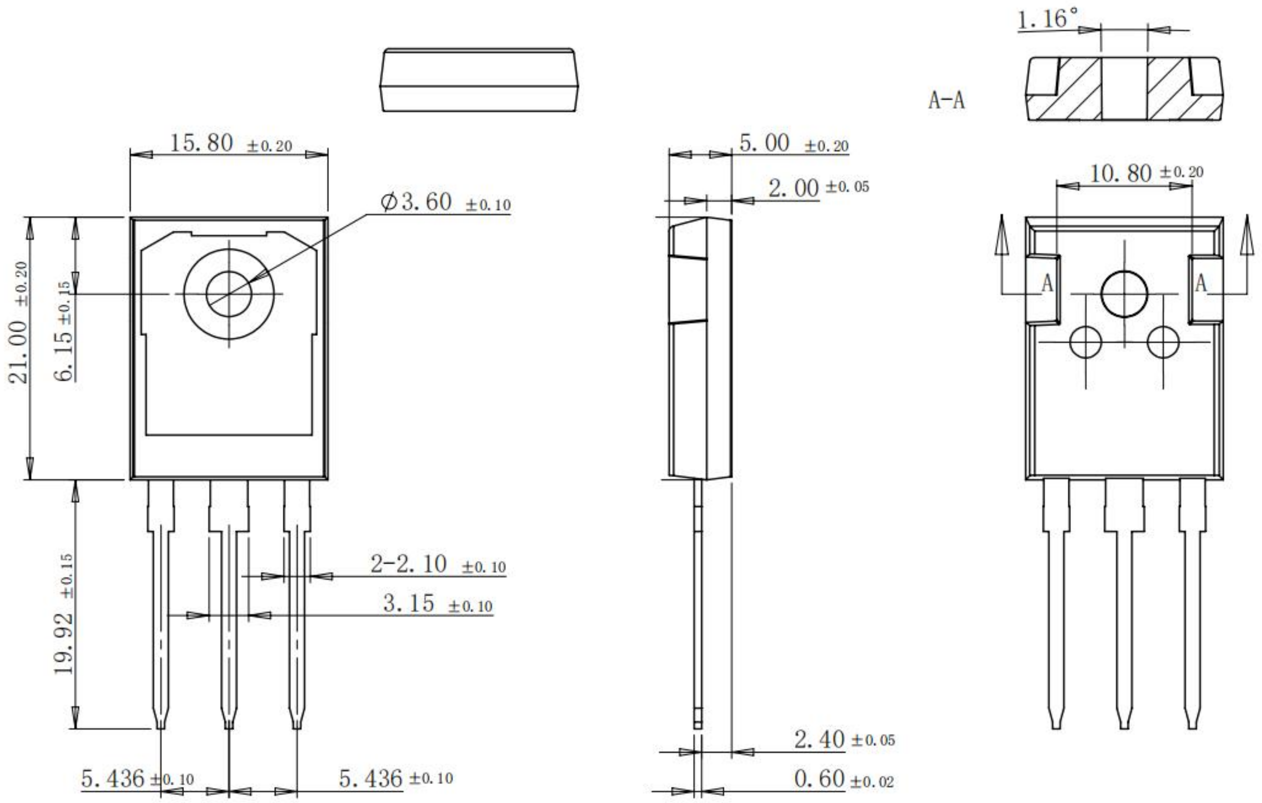


Figure 13:Typical capacitance as a function of V_{CE}(f=1Mhz,V_{GE}=0V)

Package Outlines (Unit：mm)

TO-247-3L



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