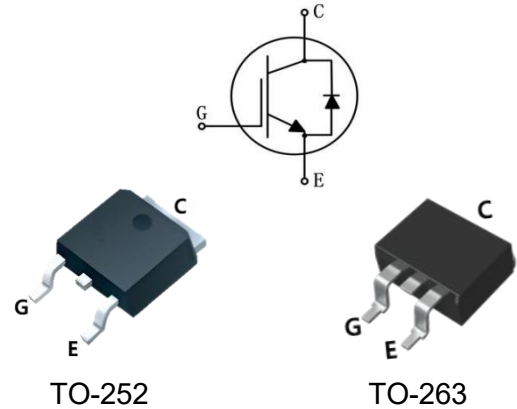


Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	650	V
I_C	20	A
$V_{CE(sat)}$	1.8	V



Features

- Trench and field-stop technology
- Low switching losses
- Positive temperature coefficient
- Low Gate-Charge

Applications

- UPS
- Motor drives
- Boost
- PFC

Product specification classification

Part Number	Package	Pack
HG10T65FX100	TO-252	Tube
HG10T65SX100	TO-263	Tube

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CES}	650	V
Gate-emitter voltage	V_{GES}	± 20	V
Continuous collector current($T_C=25^\circ C$)	I_C	20	A
Continuous collector current($T_C=100^\circ C$)		10	A
Pulsed collector current, tp limited by T_{vjmax}	I_{CM}	40	A
Diode continuous forward current($T_C=100^\circ C$)	I_F	10	A
Diode maximum current, tp limited by T_{vjmax}	I_{FM}	40	A
Short Circuit with Stand Time $V_{GE}=15V, V_{CC}\leq 400V$, Allowed Number of Short Circuits < 1000, Times Between Short Circuits $\geq 1.0s, T_J \leq 175^\circ C$	t_{sc}	10	μs
Power dissipation($T_C=25^\circ C$)	P_{tot}	100	W
Power dissipation($T_C=100^\circ C$)		50	W
Operating junction temperature range	T_{vj}	-40 to +175	$^\circ C$
Storage temperature range	T_{stg}	-55 to +150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction to case for IGBT	$R_{th(j-c)}$	1.5	$^{\circ}C/W$
Thermal resistance, junction to case for Diode	$R_{th(j-c)}$	2	$^{\circ}C/W$
Thermal resistance, junction to ambient	$R_{th(j-a)}$	62	$^{\circ}C/W$

Electrical Characteristics of IGBT ($T_{vj}=25^{\circ}C$ unless otherwise specified)
Static characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Collector-emitter breakdown voltage	$B_{V_{CES}}$	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
Collector-emitter leakage current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$	-	-	50	μA
Gate leakage current, forward	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$	-	-	± 100	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	5.5	5.8	6.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=10A, T_{vj}=25^{\circ}C$	-	1.8	-	V
		$V_{GE}=15V, I_C=10A, T_{vj}=150^{\circ}C$	-	2.1	-	V

Dynamic Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{ies}	$V_{CE}=30V$	-	667	-	pF
Output capacitance	C_{oes}	$V_{GE}=0V$	-	35	-	pF
Reverse transfer capacitance	C_{res}	$f=1MHz$	-	9	-	pF
Total gate charge	Q_g	$V_{CC}=520V, V_{GE}=15V, I_C=10A$	-	27	-	nC

Switching Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=10A$ $R_G=10\Omega$ Inductive load	-	11	-	ns
Rise time	t_r		-	9	-	ns
Turn-off delay time	$t_{d(off)}$		-	69	-	ns
Fall time	t_f		-	73	-	ns
Turn-on energy	E_{on}		-	0.18	-	mJ
Turn-off energy	E_{off}		-	0.17	-	mJ
Total switching energy	E_{ts}		-	0.35	-	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=10A$ $R_G=10\Omega$ Inductive load $T_{vj}=150^{\circ}C$	-	9	-	ns
Rise time	t_r		-	11	-	ns
Turn-off delay time	$t_{d(off)}$		-	85	-	ns
Fall time	t_f		-	111	-	ns
Turn-on energy	E_{on}		-	0.21	-	mJ
Turn-off energy	E_{off}		-	0.25	-	mJ

Total switching energy	E_{ts}	-	0.46	-	mJ
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Diode Characteristics

Parameter	Symbol	Test condition	Value			Unit
			Min.	Typ.	Max.	
Diode forward voltage	V_F	$I_F=10A, T_{vj}=25^\circ C$	-	1.4	-	V
		$I_F=10A, T_{vj}=150^\circ C$	-	1.2	-	V
Diode reverse recovery time	t_{rr}	$V_R=400V$	-	55	-	ns
Diode peak reverse recovery current	I_{rrm}	$I_F=10A$	-	11	-	A
Diode reverse recovery charge	Q_{rr}	$diF/dt=-750A/\mu s$	-	409	-	nC
Diode reverse recovery time	t_{rr}	$V_R=400V$	-	117	-	ns
Diode peak reverse recovery current	I_{rrm}	$I_F=10A$	-	11	-	A
Diode reverse recovery charge	Q_{rr}	$diF/dt=-750A/\mu s, T_{vj}=150^\circ C$	-	727	-	nC

Typical Characteristics

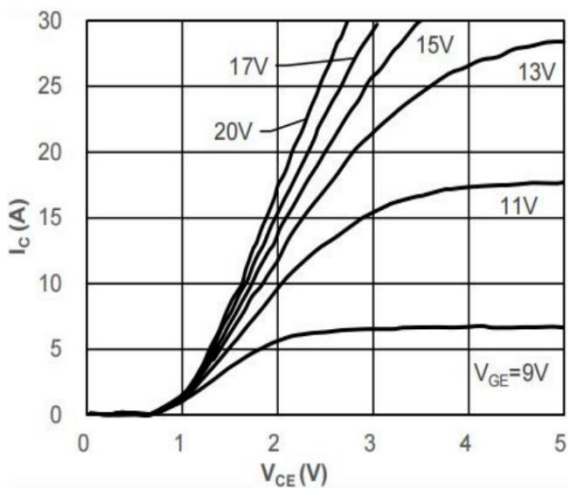


Fig 1. Typical output characteristic ($T_{vj}=25^\circ C$)

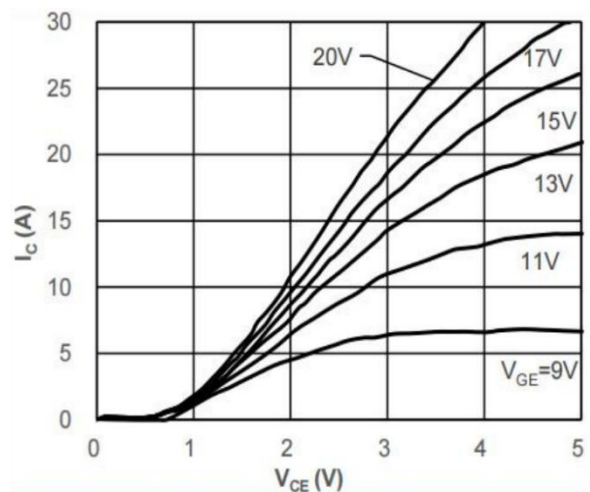


Fig 2. Typical output characteristic ($T_{vj}=175^\circ C$)

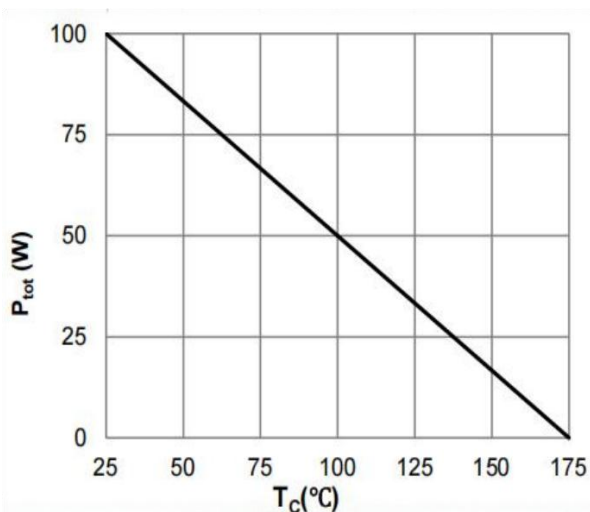


Fig 3. Power dissipation as a function of T_c

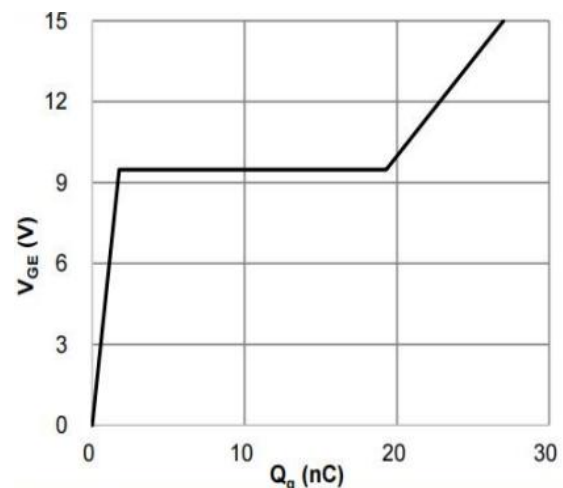


Fig 4. Typical Gate charge

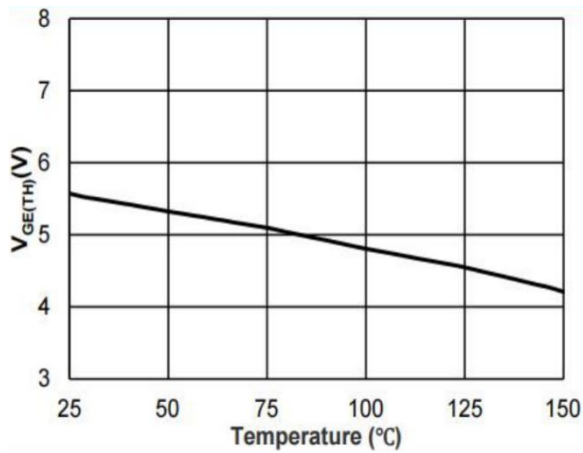


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj} ($I_c=1mA$)

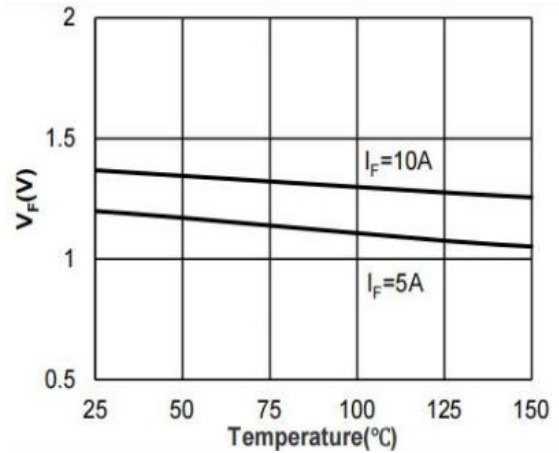


Fig 6. Typical V_F as a function of T_{vj}

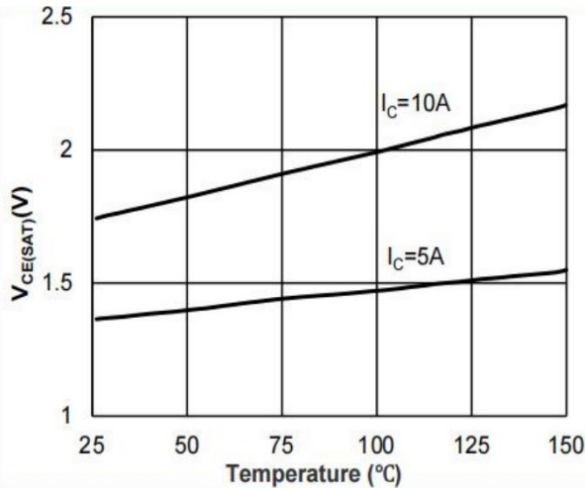


Fig 7. Typical $V_{CE(sat)}$ as a function of T_{vj}

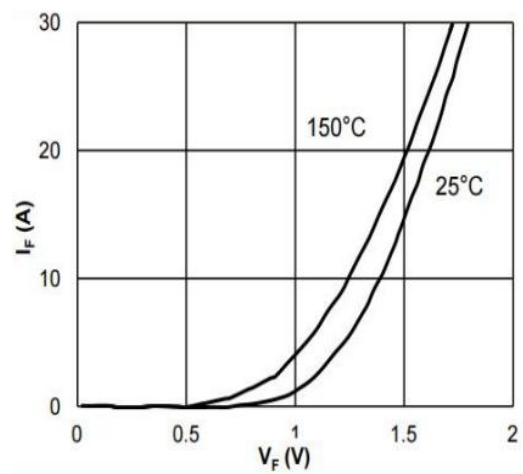


Fig 8. Typical I_F as a function of V_F

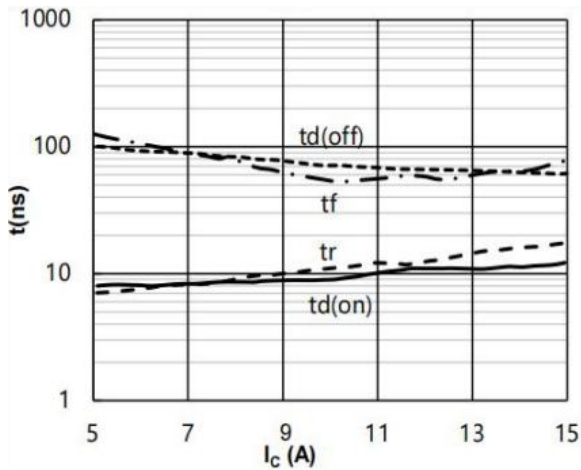


Fig 9. Typical switching time as a function of I_c

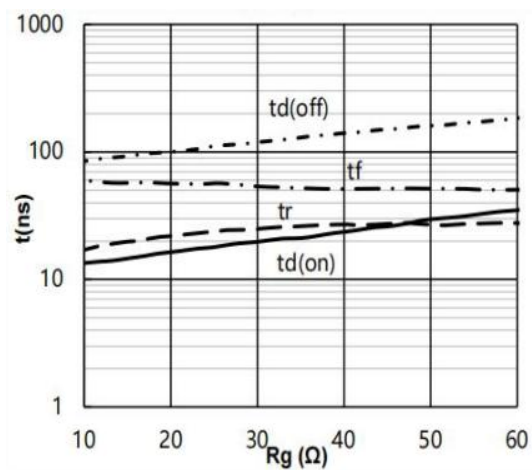


Fig 10. Typical switching time as a function of R_g

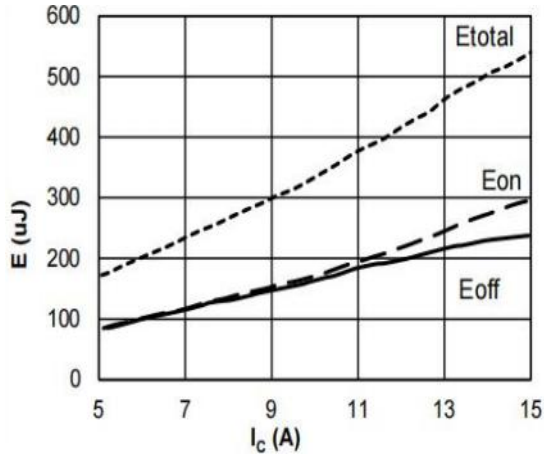


Fig 11. Typical switching energy losses as a function of I_c

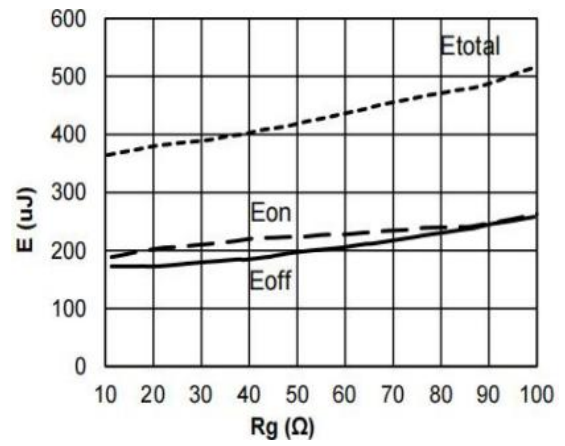


Fig 12. Typical switching energy losses as a function of R_g

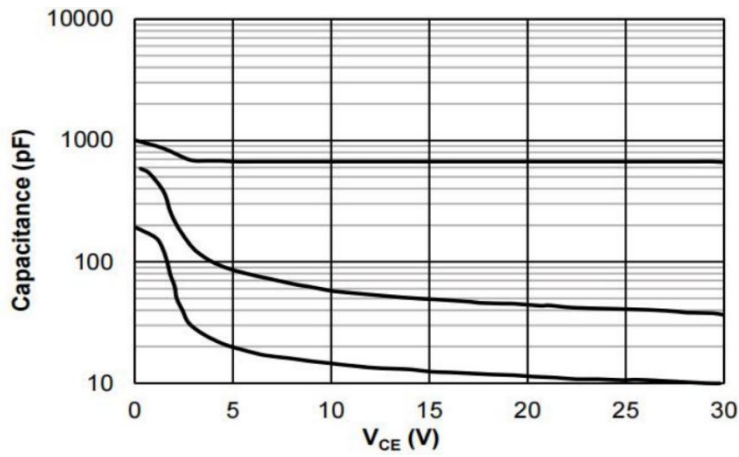
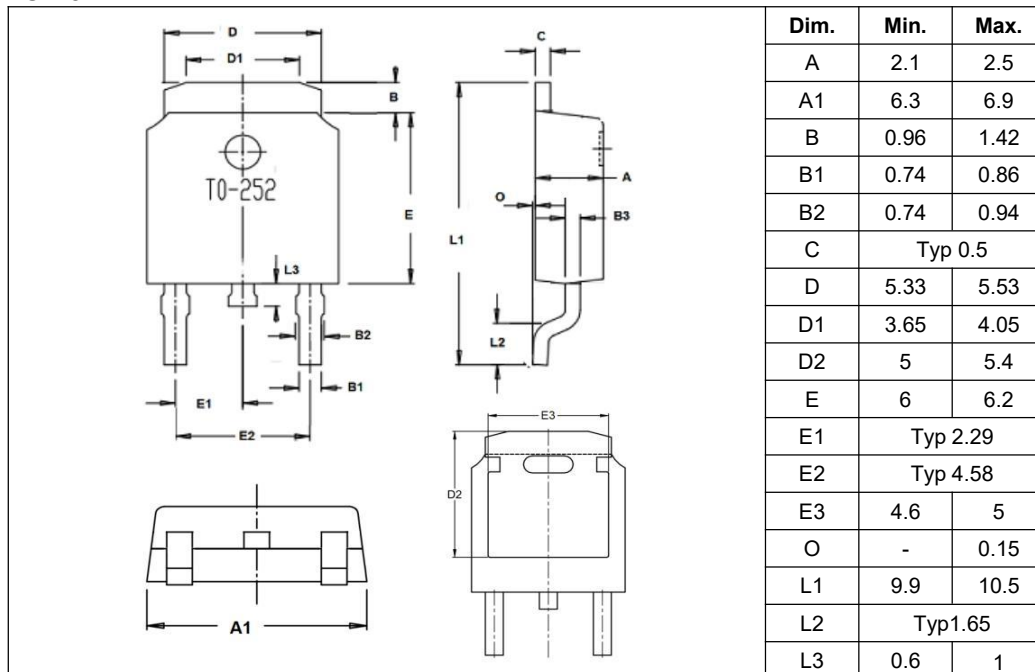


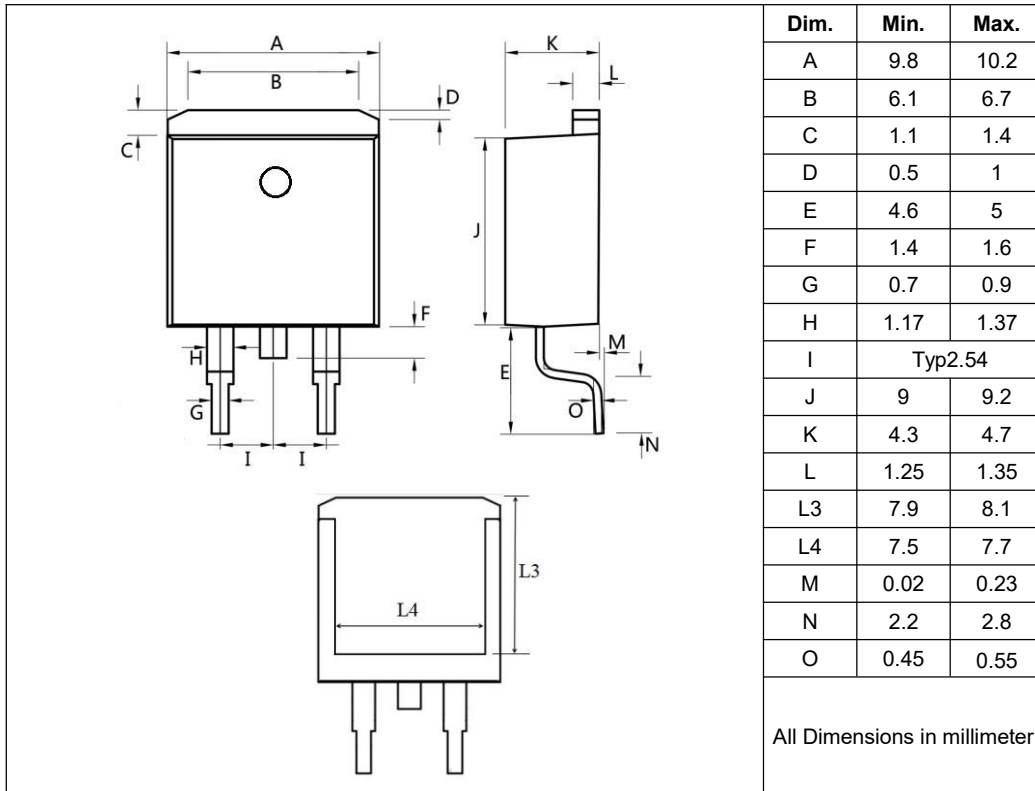
Fig 13. Typical capacitance as a function of V_{CE} ($f=1\text{Mhz}, V_{GE}=0\text{V}$)

Package Outlines (Unit: mm)

TO-252



TO-263



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