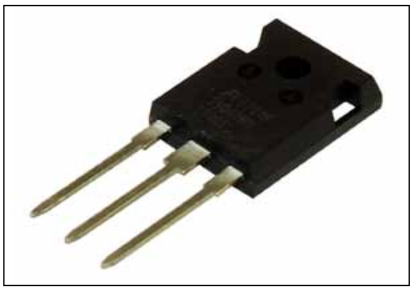
FGW30N65W

Discrete IGBT (High-Speed W series)
650V / 30A

Features
Low power loss
Low switching surge and noise
High reliability, high ruggedness (RBSOA, SCSOA etc.)

Applications
Uninterruptible power supply
PV Power conditioner
Inverter welding machine



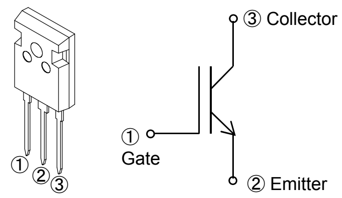
Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at T_{vj} = 25 °C unless otherwise specified)

Parameter	Symbol	Value	Unit	Remarks
Collector-Emitter Voltage	V_{CES}	650	V	
Gate-Emitter Voltage	V_{GES}	± 20	V	
Transient Gate-Emitter Voltage		± 30		t_p < 1 μs
DC Collector Current	$I_{C@25}$	46	A	T_C =25°C
	$I_{C@100}$	30	A	T_C =100°C
Pulsed Collector Current	I_{CP}	120	A	Note *1
Turn-Off Safe Operating Area	-	120	A	V_{CE} ≤ 650 V T_{vj} ≤ 175°C
Max. Power Dissipation	P_{tot}	180	W	T_C = 25°C
Operating Junction Temperature	T_{vj}	-40 ~ +175	°C	
Storage Temperature	T_{stg}	-55 ~ +175	°C	

Note *1 : Pulse width limited by T_{vjmax}.

Equivalent circuit



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(Out view: see to 5 page)

● Electrical characteristics (at T_{vj} = 25 °C unless otherwise specified)

Parameter	Symbol	Conditions		min.	typ.	max.	Unit
Zero Gate Voltage Collector Current	I_{CES}	V_{CE} = 650 V, V_{GE} = 0 V	T_{vj}= 25°C	-	-	250	μA
			T_{vj}= 175°C	-	-	2	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V		-	-	200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{CE} = 20 V, I_C = 30 mA		3.0	4.0	5.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15 V, I_C = 30 A	T_{vj}= 25°C	1.40	1.80	2.20	V
			T_{vj}= 125°C	-	2.05	-	
			T_{vj}= 175°C	-	2.10	-	
Input Capacitance	C_{ies}	V_{CE} = 25 V V_{GE} = 0 V f = 1 MHz		1150	2300	3450	pF
Output Capacitance	C_{oes}			33	66	99	
Reverse Transfer Capacitance	C_{res}			25	50	75	
Gate Charge	Q_G	V_{CC} = 520 V I_C = 30 A V_{GE} = 15 V		64	128	192	nC
Turn-On Delay Time	$t_{d(on)}$	T_{vj} = 25°C, V_{CC} = 400 V I_C = 15 A, V_{GE} = 15 V R_G = 10 Ω Energy loss include “tail” and FWD reverse recovery.		9	18	27	ns
Rise Time	t_r			5.5	11	16.5	
Turn-Off Delay Time	$t_{d(off)}$			74	148	222	
Fall Time	t_f			5.5	11	16.5	
Turn-On Energy	E_{on}			0.06	0.12	0.18	mJ
Turn-Off Energy	E_{off}			0.07	0.15	0.23	
Turn-On Delay Time	$t_{d(on)}$	T_{vj} = 150°C, V_{CC} = 400 V I_C = 15 A, V_{GE} = 15 V R_G = 10 Ω Energy loss include “tail” and FWD reverse recovery.		9	18	27	ns
Rise Time	t_r			6	12	18	
Turn-Off Delay Time	$t_{d(off)}$			89	178	267	
Fall Time	t_f			8	16	24	
Turn-On Energy	E_{on}			0.10	0.21	0.32	mJ
Turn-Off Energy	E_{off}			0.12	0.25	0.38	

● Thermal resistance characteristics

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Thermal Resistance, Junction-Ambient	$R_{th(j-a)}$	-	-	-	50	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	-	-	-	0.831	

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Characteristics (Representative)

Figure 1. DC Collector Current vs T_c

$V_{GE} \geq +15$ V, $T_{vj} \leq 175°C$

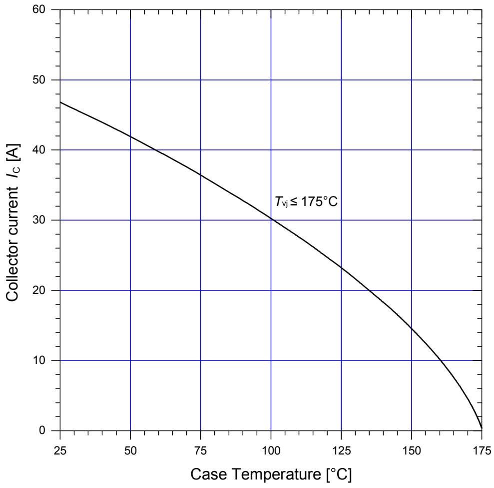


Figure 2. SOA

Duty = 0, T_c = 25°C

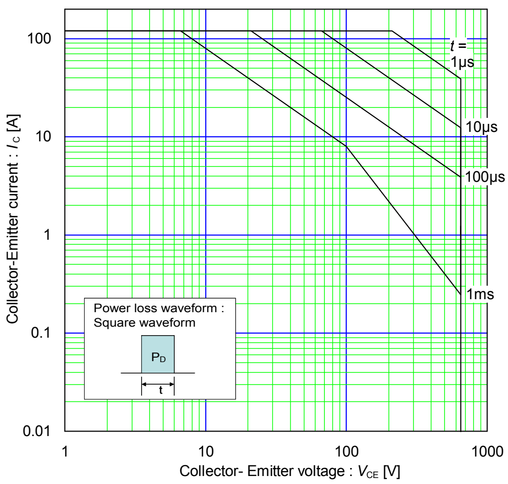


Figure 3. Typical output characteristics

T_{vj}= 25°C

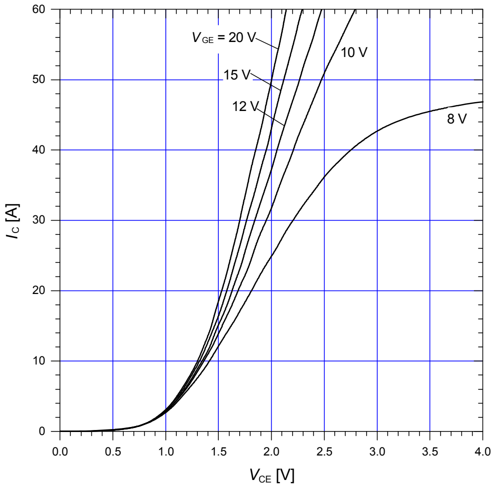


Figure 4. Typical output characteristics

T_{vj}= 175°C

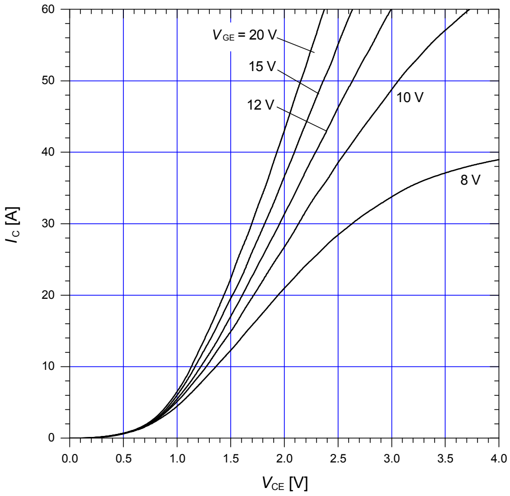


Figure 5. Typical transfer characteristics

V_{CE} = 10 V

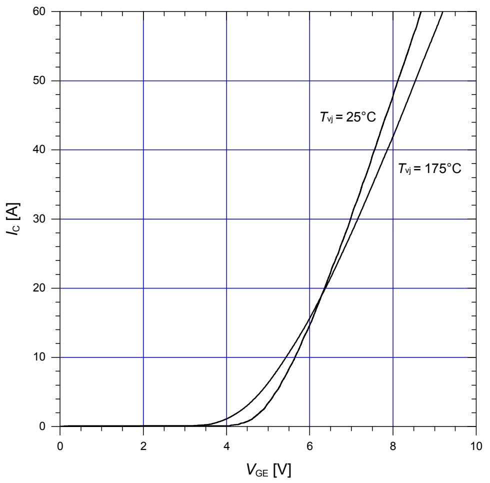


Figure 6. Gate threshold voltage

I_C = 30 mA, V_{CE} = 20 V

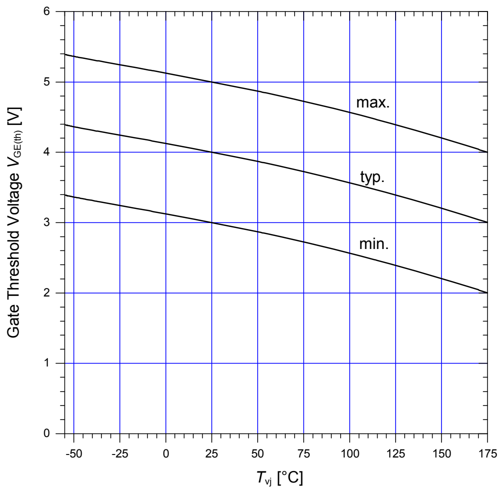


Figure 7. Typical capacitance

V_{GE} = 0 V, f = 1 MHz

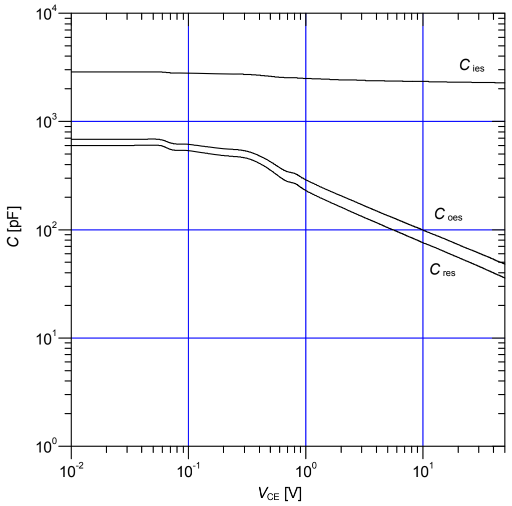


Figure 8. Typical gate charge

I_C = 30 A, V_{CC} = 520 V, T_{vj} = 25°C

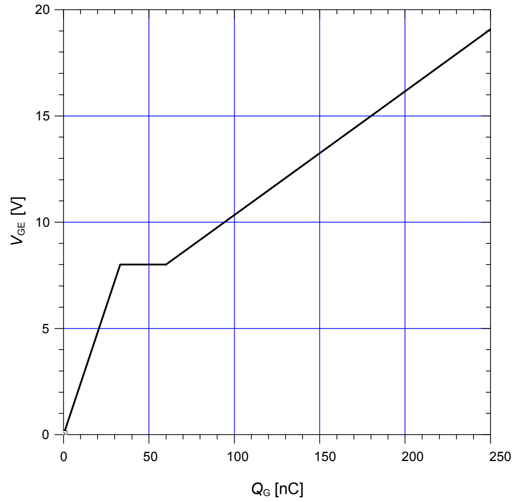


Figure 9. Typical switching times vs. I_C

V_{CC} = 400 V, V_{GE} = 15 V, R_G = 10 Ω, T_{vj} = 150°C

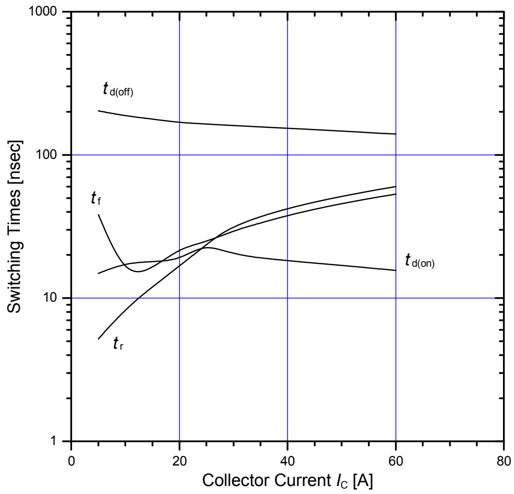


Figure 10. Typical switching times vs. R_G

V_{CC} = 400 V, V_{GE} = 15 V, I_C = 15 A, T_{vj} = 150°C

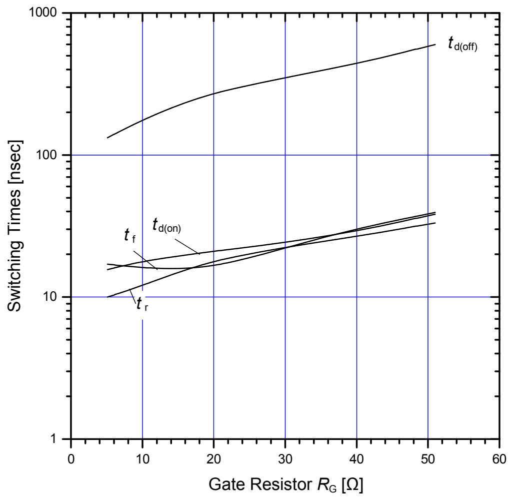


Figure 11. Typical switching losses vs. I_C

V_{CC} = 400 V, V_{GE} = 15 V, R_G = 10 Ω, T_{vj} = 150°C

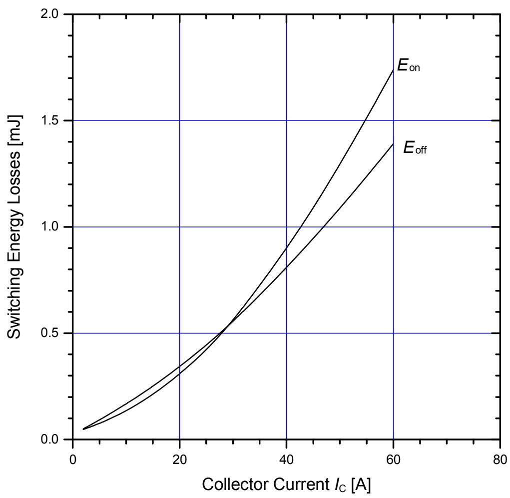


Figure 12. Typical switching losses vs. R_G

V_{CC} = 400 V, V_{GE} = 15 V, I_C = 15 A, T_{vj} = 150°C

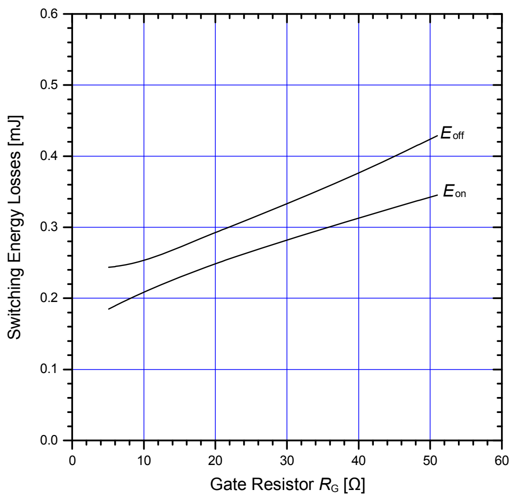


Figure 13. Reverse biased safe operating area

V_{GE} = 15 V / 0 V, R_G = 10 Ω, T_{vj} ≤ 175°C

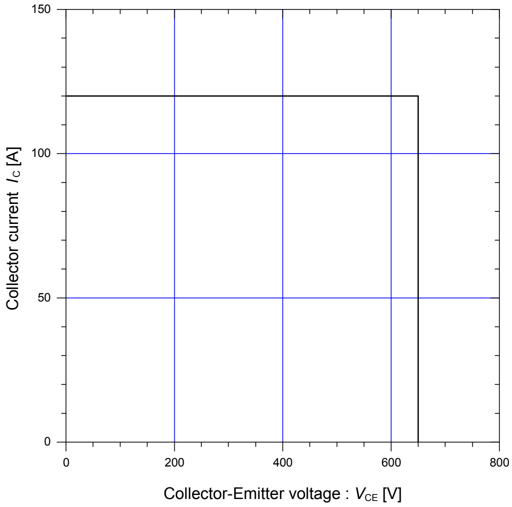
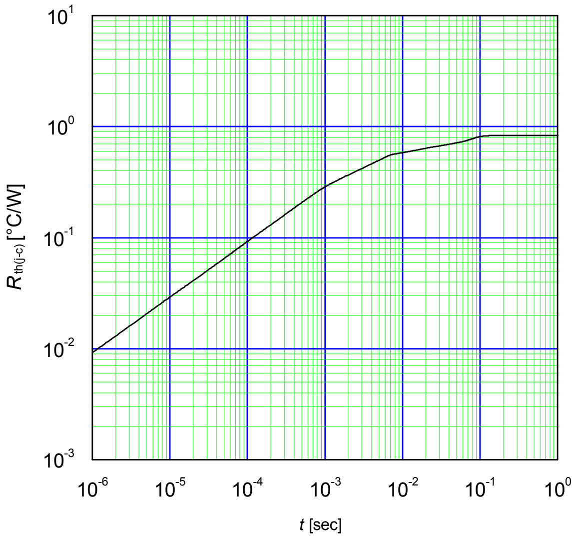
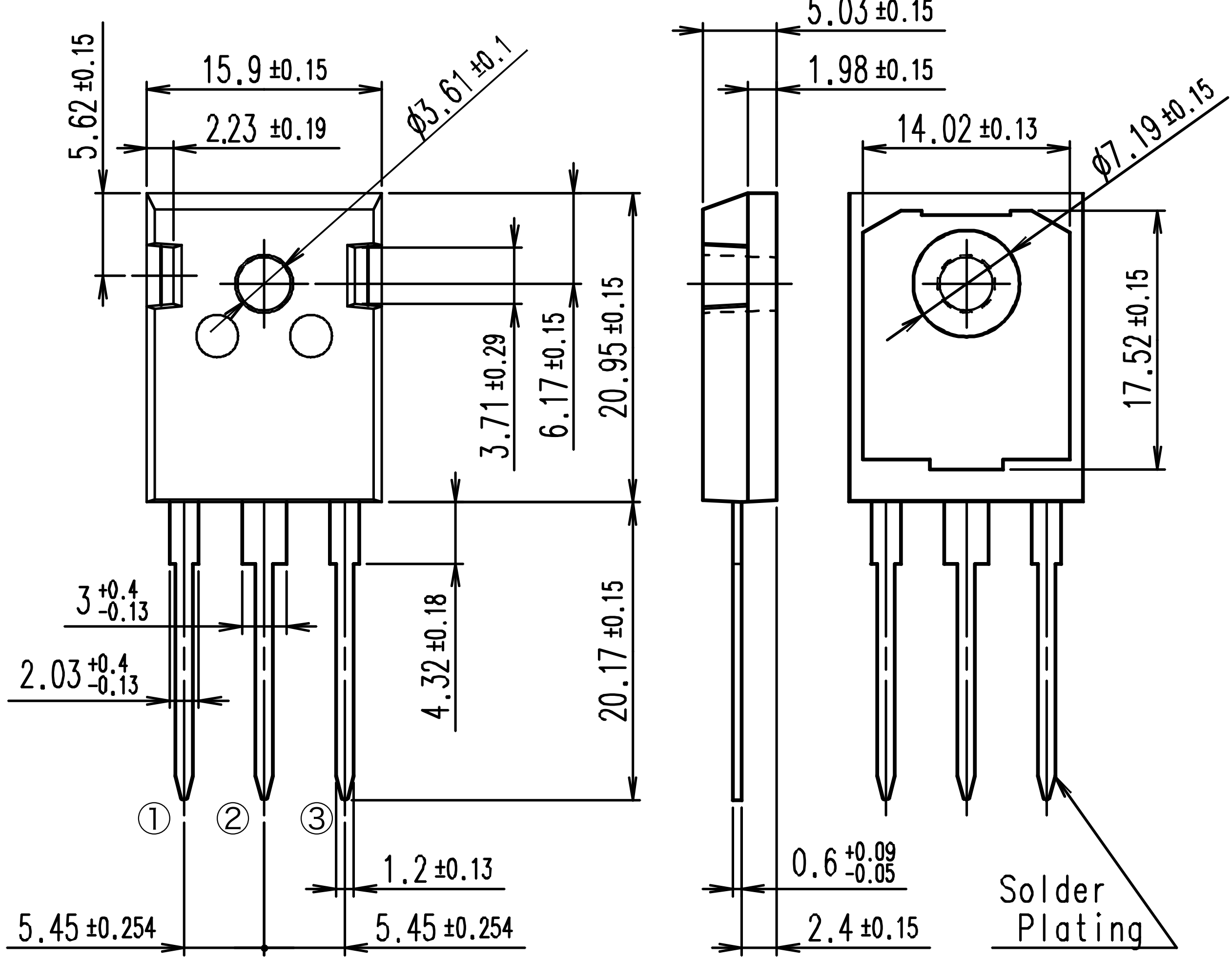


Figure 14. Transient Thermal Impedance

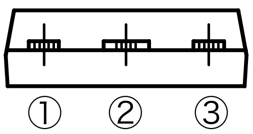
D = 0



Outline Drawings, mm



CONNECTION
① GATE
② COLLECTOR
③ EMITTER



DIMENSIONS ARE IN MILLIMETERS.

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