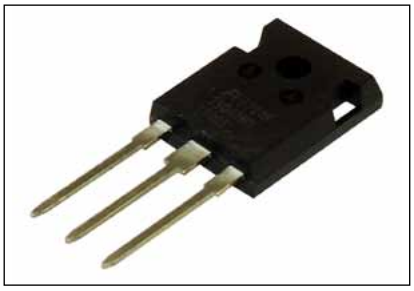
FGW60N65W

Discrete IGBT (High-Speed W series)
650V / 60A

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

Applications
Uninterruptible power supply
PV Power coditionner
Inverter welding machine



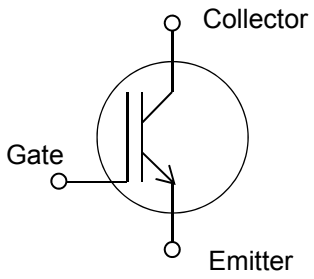
Maximum Ratings and Characteristics

● **Absolute Maximum Ratings (at T_c=25°C unless otherwise specified)**

Items	Symbols	Characteristics	Units	Remarks
Collector-Emitter Voltage	V_{CES}	650	V	
Gate-Emitter Voltage	V_{GES}	±20	V	
Transient Gate-Emitter Voltage		±30		T_p<1μs
DC Collector Current	$I_{C@25}$	83	A	T_C=25°C
	$I_{C@100}$	60	A	T_C=100°C
Pulsed Collector Current	I_{CP}	240	A	Note *1
Turn-Off Safe Operating Area	-	240	A	V_{CE}≤650V T_j≤175°C
Max. Power Dissipation	P_D	405	W	T_C=25°C
Operating Junction Temperature	T_j	-40 ~ +175	°C	
Storage Temperature	T_{stg}	-55 ~ +175	°C	

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

Equivalent circuit



● **Electrical characteristics (at T_j= 25°C unless otherwise specified)**

Description	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Zero Gate Voltage Collector Current	I_{CES}	V_{CE} = 650V, V_{GE} = 0V	T_j=25°C	-	-	250	μA
			T_j=175°C	-	-	2	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V		-	-	200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{CE} = 20V, I_C = 60mA		3.0	4.0	5.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 60A	T_j=25°C	1.40	1.80	2.20	V
			T_j=125°C	-	2.05	-	
			T_j=175°C	-	2.10	-	
Input Capacitance	C_{ies}	V_{CE}=25V		2150	4300	6450	pF
Output Capacitance	C_{oes}	V_{GE}=0V		63	125	188	
Reverse Transfer Capacitance	C_{res}	f=1MHz		48	95	143	
Gate Charge	Q_G	V_{CC} = 520V I_C = 60A V_{GE} = 15V		125	250	375	nC
Turn-On Delay Time	$t_{d(on)}$	T_j = 25°C, V_{CC} = 400V I_C = 30A, V_{GE} = 15V R_G = 10Ω, L = 500μH Energy loss include “tail” and FWD (FGW60N65WD) reverse recovery.		15	29	44	ns
Rise Time	t_r			20	40	60	
Turn-Off Delay Time	$t_{d(off)}$			130	260	390	
Fall Time	t_f			39	78	117	
Turn-On Energy	E_{on}			0.30	0.60	0.90	mJ
Turn-Off Energy	E_{off}			0.34	0.67	1.01	
Turn-On Delay Time	$t_{d(on)}$	T_j = 150°C, V_{CC} = 400V I_C = 30A, V_{GE} = 15V R_G = 10Ω, L = 500μH Energy loss include “tail” and FWD (FGW60N65WD) reverse recovery.		15	29	44	ns
Rise Time	t_r			20	40	60	
Turn-Off Delay Time	$t_{d(off)}$			148	295	443	
Fall Time	t_f			34	68	102	
Turn-On Energy	E_{on}			0.48	0.96	1.44	mJ
Turn-Off Energy	E_{off}			0.37	0.73	1.10	

● **Thermal resistance characteristics**

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal Resistance, Junction-Ambient	$R_{th(j-a)}$	-	-	-	50	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	-	-	-	0.366	

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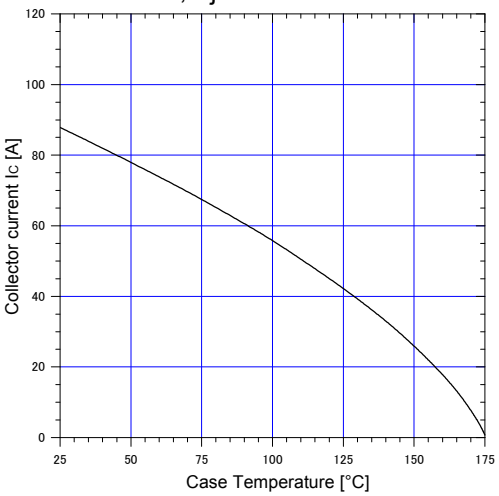
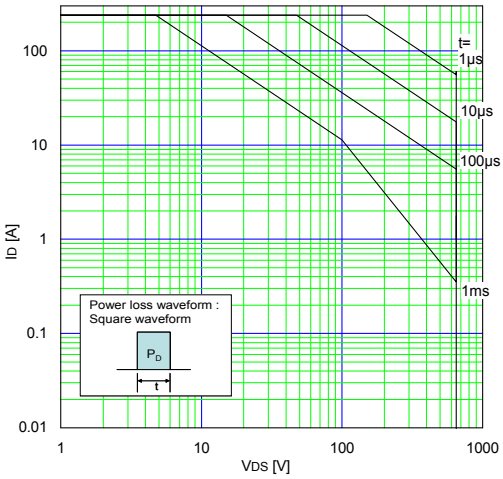
Characteristics (Representative)

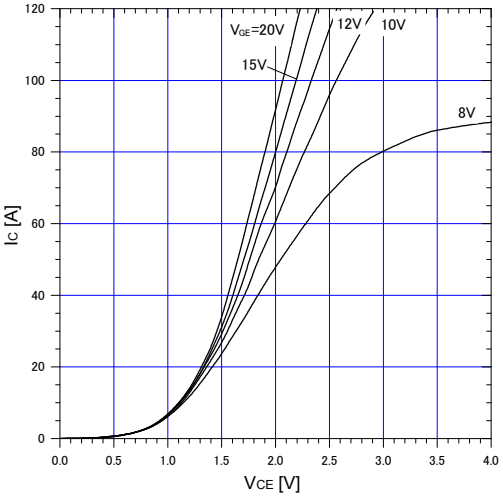
Graph.1
DC Collector Current vs Tc
V_{GE}≥+15V, Tj≤175°C



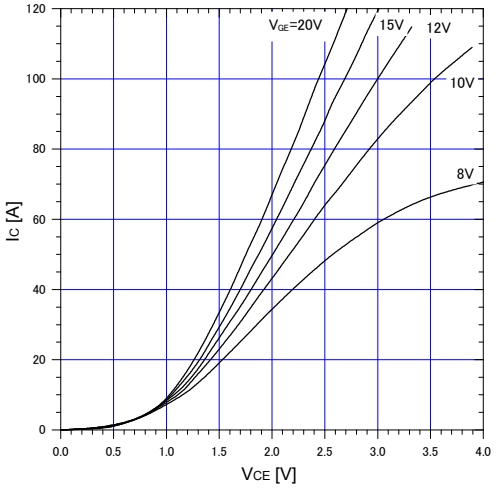
Graph.2
FBSOA
Duty=0(Single pulse), Tc=25°C



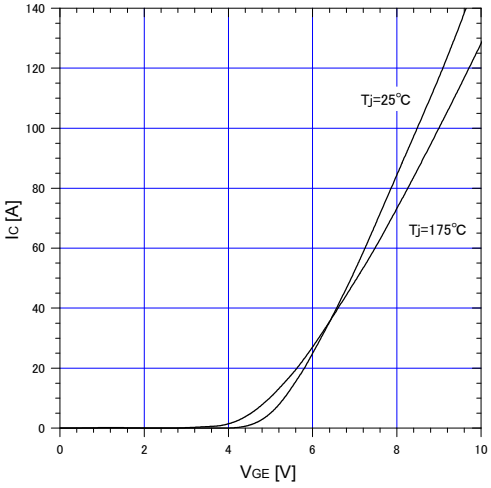
Graph.3
Typical Output Characteristics (V_{CE}-I_C)
Tj=25°C



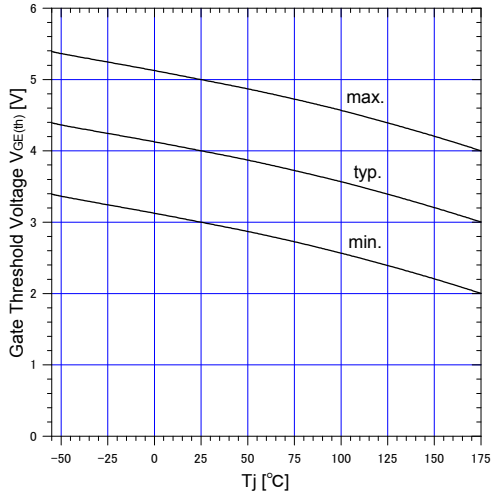
Graph.4
Typical Output Characteristics (V_{CE}-I_C)
Tj=175°C



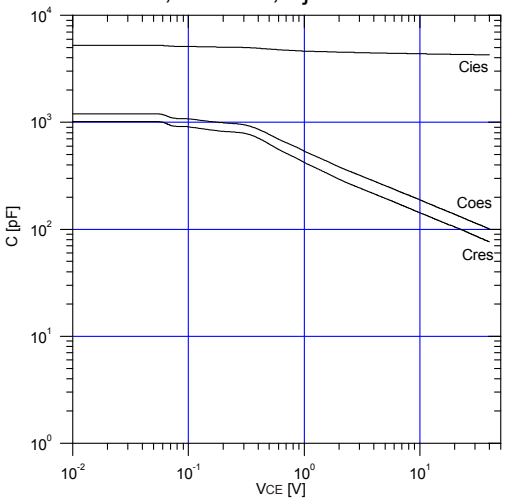
Graph.5
Typical Transfer Characteristics
V_{CE}=10V



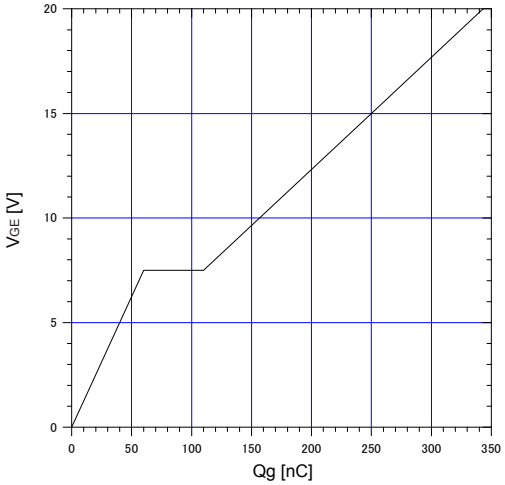
Graph.6
Gate Threshold Voltage vs. Tj
I_C=60mA, V_{CE}=20V



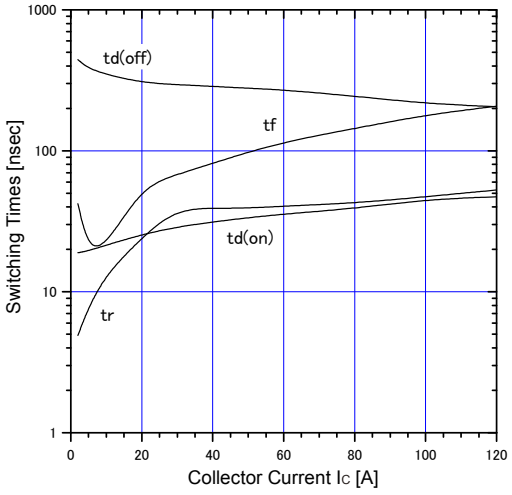
Graph.7
Typical Capacitance
V_{GE}=0V, f=1MHz, Tj=25°C



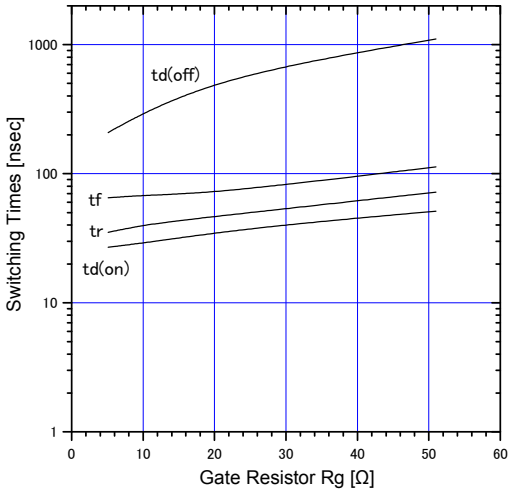
Graph.8
Typical Gate Charge
Vcc=520V, I_C=60A, Tj=25°C



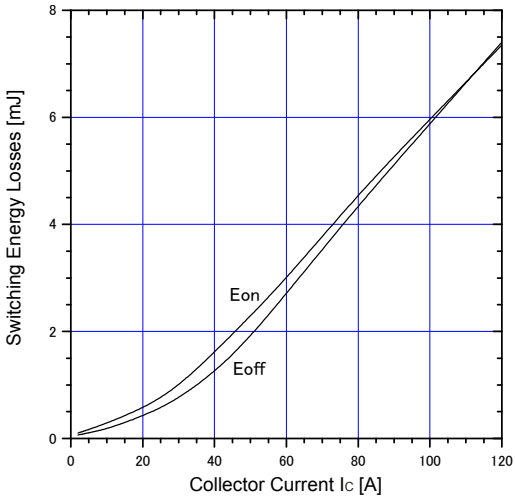
Graph.9
Typical switching time vs. Ic
Tj=150°C, Vcc=400V, L=500µH
V_{GE}=15V, R_G=10Ω



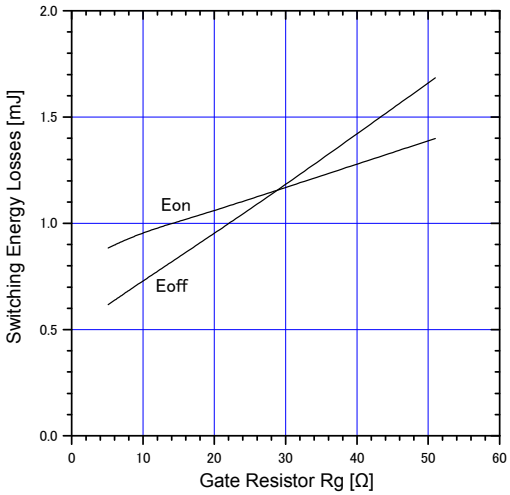
Graph.10
Typical switching time vs. Rg
Tj=150°C, Vcc=400V, I_C=30A, L=500µH
V_{GE}=15V



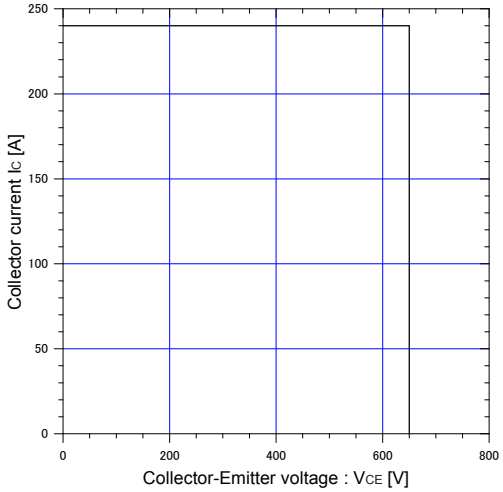
Graph.11
Typical switching losses vs. Ic
Tj=150°C, Vcc=400V, L=500µH
V_{GE}=15V, R_G=10Ω



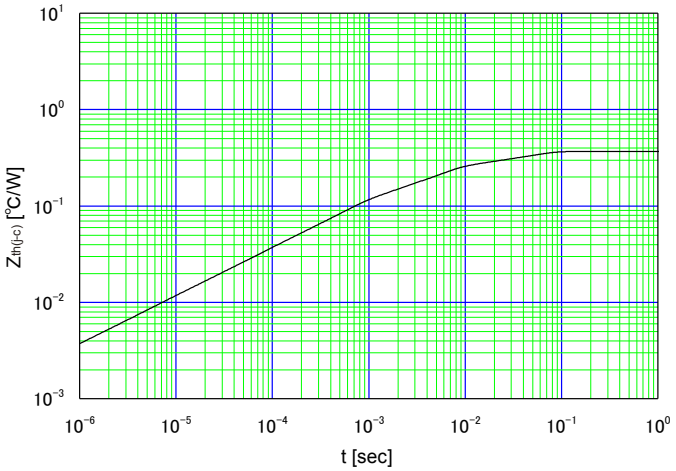
Graph.12
Typical switching losses vs. Rg
Tj=150°C, Vcc=400V, I_C=30A, L=500µH
V_{GE}=15V



Graph.13
Reverse biased Safe Operating Area
Tj≤175°C, V_{GE}=+15V/0V, R_G=10Ω

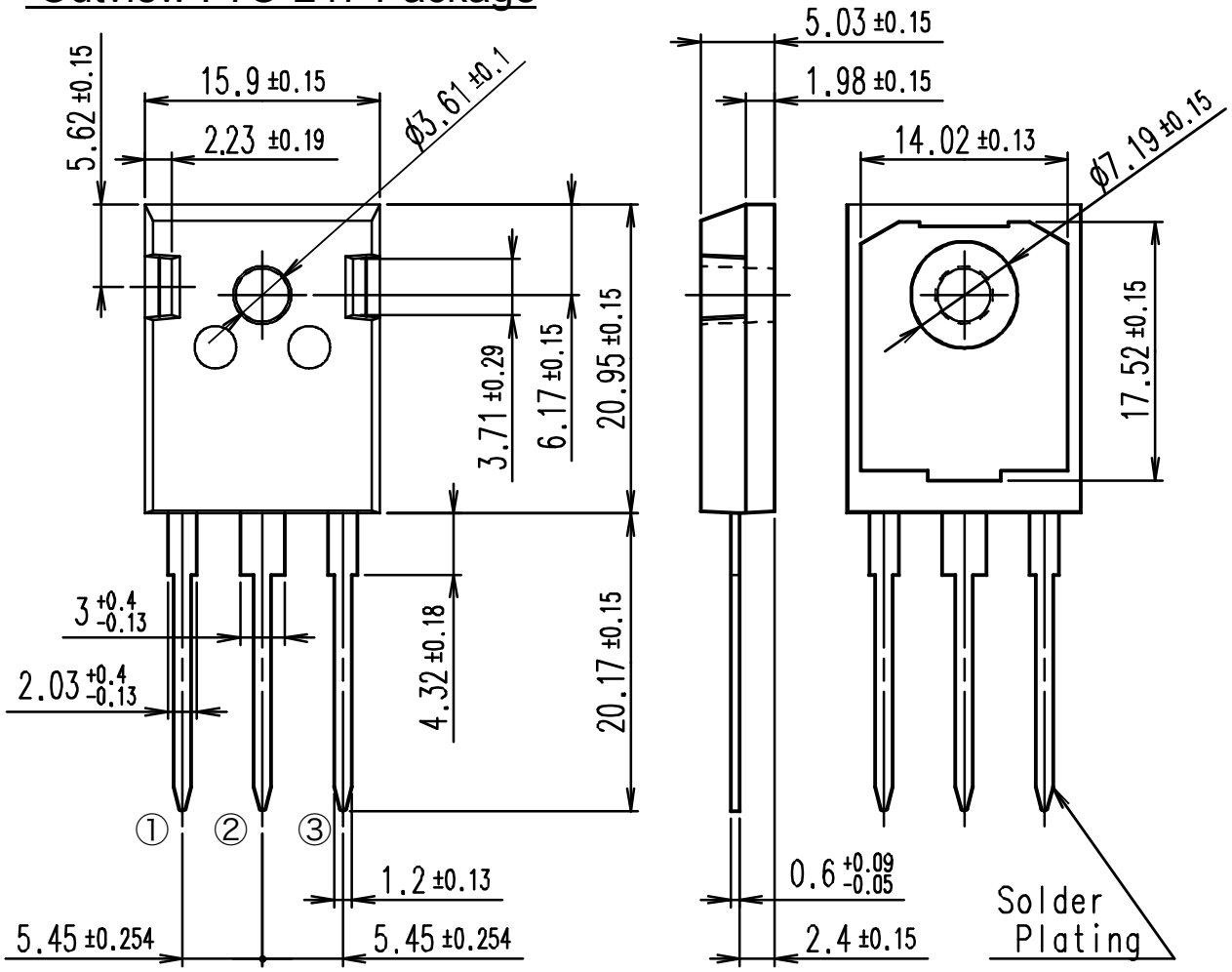


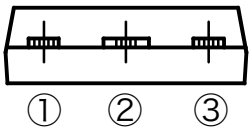
Graph.14
Transient thermal resistance of IGBT



Outline Drawings, mm

Outview : TO-247 Package





CONNECTION

① GATE

② COLLECTOR

③ EMITTER

DIMENSIONS ARE IN MILLIMETERS.

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- Machine tools
- Audiovisual equipment
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- Personal equipment
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- Safety devices
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