Fuji Electric

Innovating Energy Technology

FGZ75XS65C

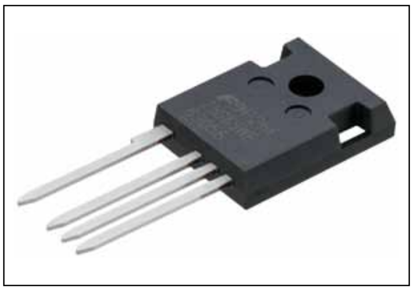
http://www.fujielectric.com/products/semiconductor/

Discrete IGBT

Discrete IGBT (High-Speed XS-series)
650V / 75A

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

Applications
Uninterruptible power supply
PV Power coditionner
Inverter welding machine



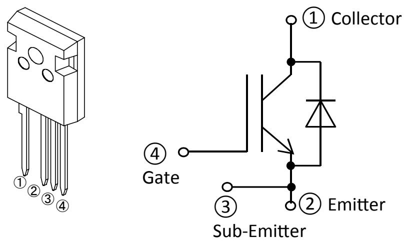
Maximum Ratings and Characteristics

● 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	$I_{C@25}$	115	A	T_C = 25 °C
	$I_{C@100}$	75	A	T_C = 100 °C
Pulsed Collector Current	I_{CP}	300	A	Note *1
Turn-Off Safe Operating Area	-	300	A	V_{CE} ≤ 650 V T_{vj} ≤ 175 °C
Diode Forward Current	$I_{F@25}$	118	A	
	$I_{F@100}$	75	A	
Diode Pulsed Current	I_{FP}	300	A	Note *1
IGBT Max. Power Dissipation	P_{tot_IGBT}	437	W	T_C = 25 °C
FWD Max. Power Dissipation	P_{tot_FWD}	327	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 $T_{vj\,max}$.

Equivalent circuit



TO-247-4-P2

● 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 = 75 mA		3.4	4.0	4.6	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15 V I_C = 75 A	T_{vj} = 25 °C	1.00	1.35	1.70	V
			T_{vj} = 125 °C	-	1.50	-	
			T_{vj} = 175 °C	-	1.60	-	
Input Capacitance	C_{ies}	V_{CE} = 25 V		2970	5940	8910	pF
Output Capacitance	C_{oes}	V_{GE} = 0 V		67	134	201	
Reverse Transfer Capacitance	C_{res}	f = 1 MHz		30	60	90	
Gate Charge	Q_G	V_{CC} = 520 V I_C = 75 A V_{GE} = 15 V		150	300	450	nC
Turn-On Delay Time	$t_{d(on)}$	T_{vj}= 25 °C		23	45	67	ns
Rise Time	t_r	V_{CC} = 400 V		11	21	31	
Turn-Off Delay Time	$t_{d(off)}$	I_C = 37.5 A		170	340	510	
Fall Time	t_f	V_{GE} = 15 V		11	21	31	
Turn-On Energy	E_{on}	R_G = 10 Ω		0.25	0.50	0.75	mJ
Turn-Off Energy	E_{off}	Energy loss include “tail” and FWD reverse recovery.		0.37	0.74	1.11	
Turn-On Delay Time	$t_{d(on)}$	T_{vj} = 150 °C		25	50	75	ns
Rise Time	t_r	V_{CC} = 400 V		13	25	37	
Turn-Off Delay Time	$t_{d(off)}$	I_C = 37.5 A		190	380	570	
Fall Time	t_f	V_{GE} = 15 V		16	32	48	
Turn-On Energy	E_{on}	R_G = 10 Ω		0.40	0.80	1.20	mJ
Turn-Off Energy	E_{off}	Energy loss include “tail” and FWD reverse recovery.		0.50	1.00	1.50	
Forward Voltage Drop	V_F	I_F = 75 A	T_{vj} = 25 °C	1.25	1.70	2.15	V
			T_{vj} = 125 °C	-	1.78	-	V
			T_{vj} = 175 °C	-	1.78	-	V
Diode Reverse Recovery Time	t_{rr}	V_{CC} = 400 V		44	88	132	ns
Diode Reverse Recovery Charge	Q_{rr}	I_F = 37.5 A $-di_F/dt$ = 1500 A/µs T_{vj} = 25 °C		1.25	2.50	3.75	µC
Diode Reverse Recovery Time	t_{rr}	V_{CC} = 400 V		48	96	144	ns
Diode Reverse Recovery Charge	Q_{rr}	I_F = 37.5 A $-di_F/dt$ = 1400 A/µs T_{vj} = 150 °C		1.6	3.1	4.6	µC

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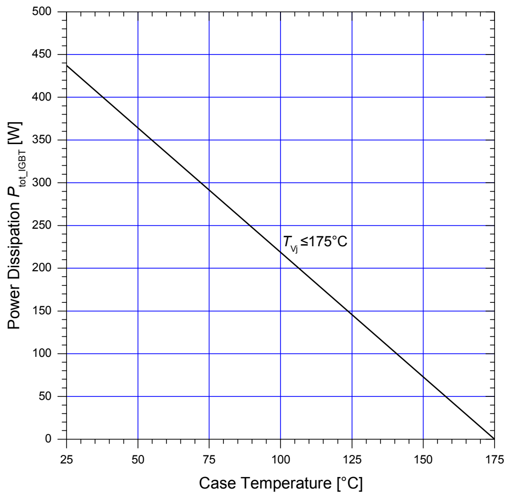
● **Thermal Resistance**

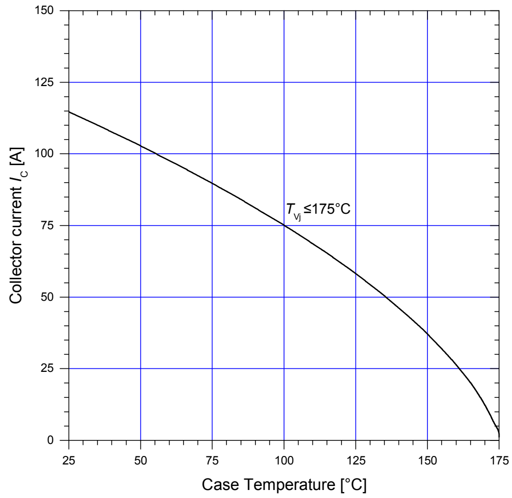
Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction-Ambient	$R_{th(j-a)}$	-	-	50	°C/W
Thermal Resistance, IGBT Junction to Case	$R_{th(j-c)\_IGBT}$	-	-	0.343	°C/W
Thermal Resistance, FWD Junction to Case	$R_{th(j-c)\_FWD}$	-	-	0.459	°C/W

Characteristics (Representative)

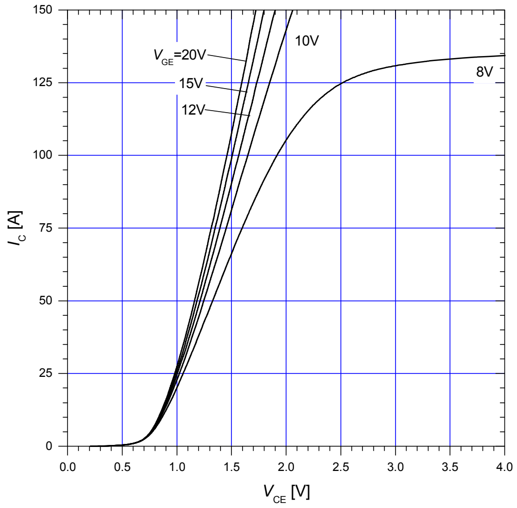
Graph 1
IGBT Power Dissipation vs T_c
$T_{vj} \leq 175$ °C



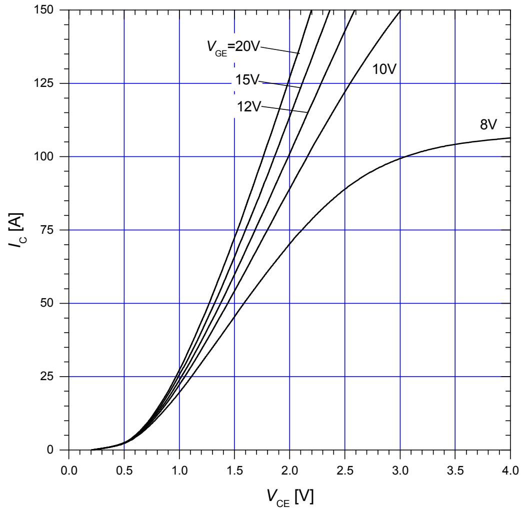
Graph 2
DC Collector Current vs T_c
$V_{GE} \geq +15$ V, $T_{vj} \leq 175$ °C



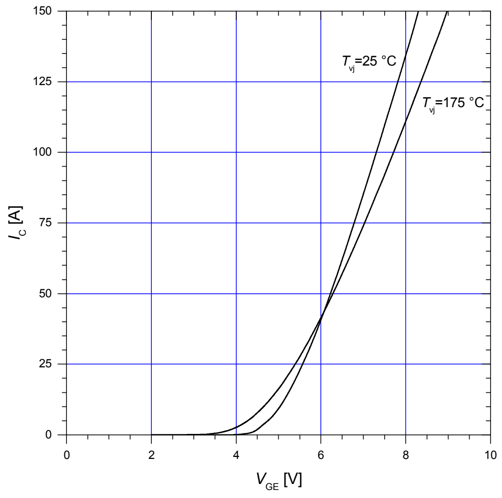
Graph 3
Typical output characteristics
$T_{vj} = 25$ °C



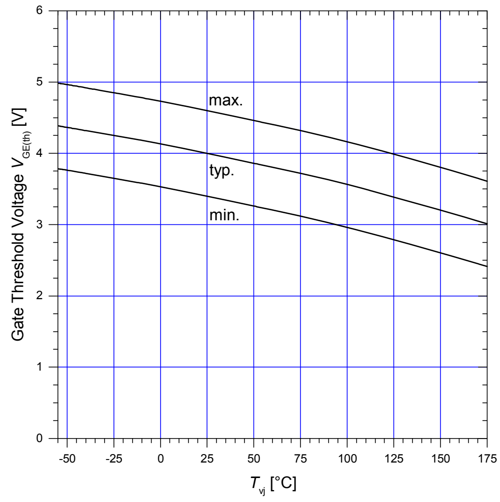
Graph 4
Typical output characteristics
$T_{vj} = 175$ °C



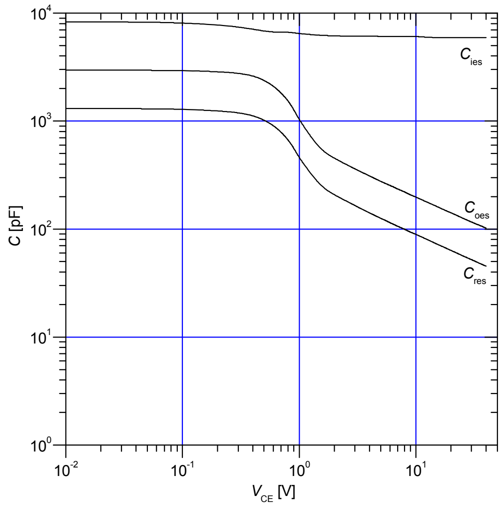
Graph 5
Typical transfer characteristics
$V_{CE} = 20$ V



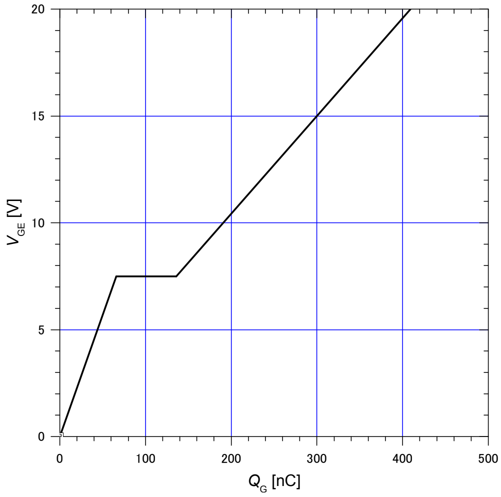
Graph 6
Gate threshold voltage
$I_C = 75$ mA, $V_{CE} = 20$ V



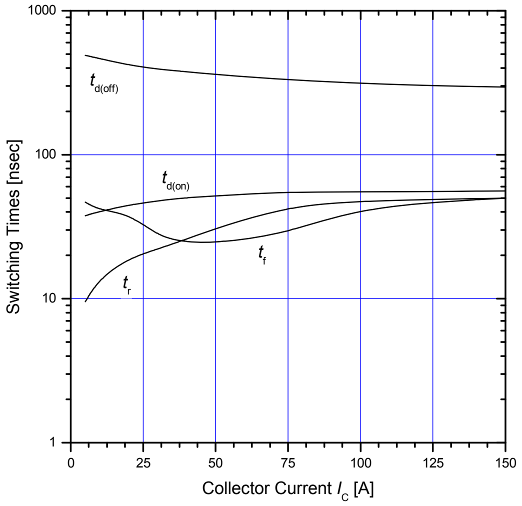
Graph 7
Typical capacitance
V_{GE} = 0 V, f = 1 MHz



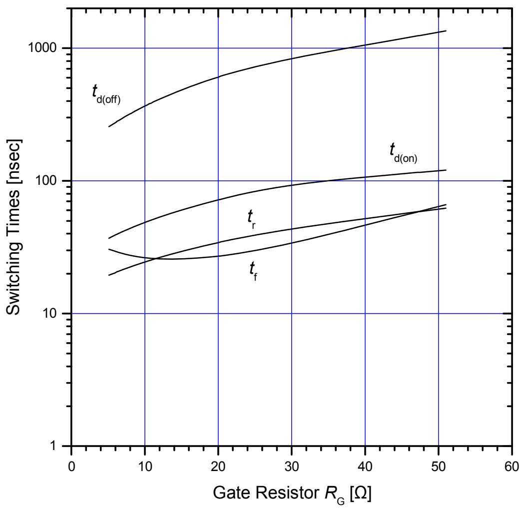
Graph 8
Typical gate charge
I_C = 75 A, V_{CC} = 520 V, T_{vj} = 25 °C



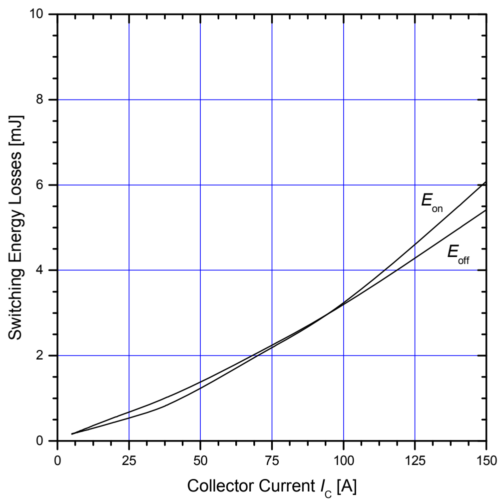
Graph 9
Typical switching times vs. I_C
V_{CC} = 400 V, V_{GE} = 15 V, R_G = 10 Ω, T_{vj} = 150 °C



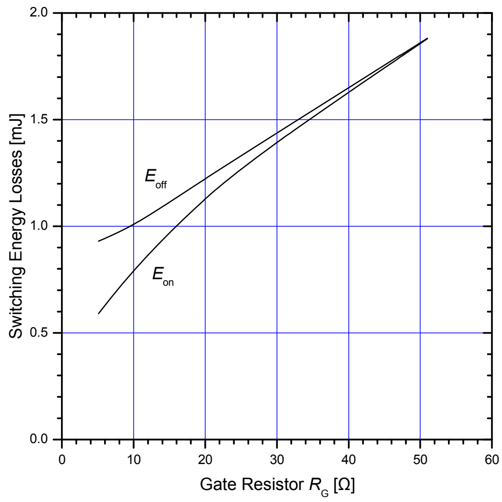
Graph 10
Typical switching times vs. R_G
V_{CC} = 400 V, V_{GE} = 15 V, I_C = 37.5 A, T_{vj} = 150 °C



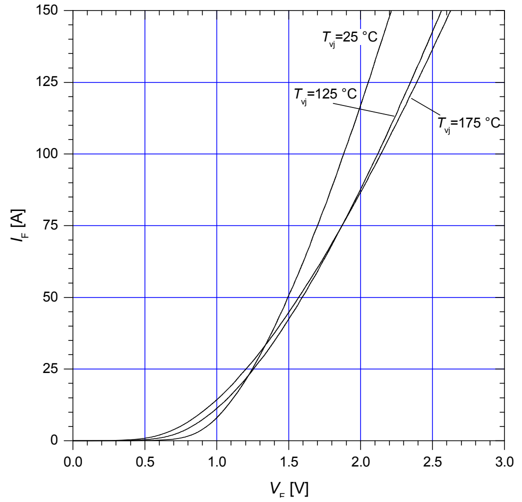
Graph 11
Typical switching losses vs. I_C
V_{CC} = 400 V, V_{GE} = 15 V, R_G = 10 Ω, T_{vj} = 150 °C



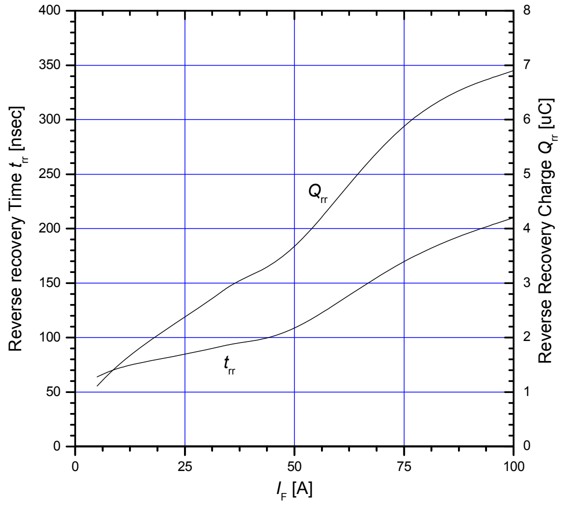
Graph 12
Typical switching losses vs. R_G
V_{CC} = 400 V, V_{GE} = 15 V, I_C = 37.5 A, T_{vj} = 150 °C



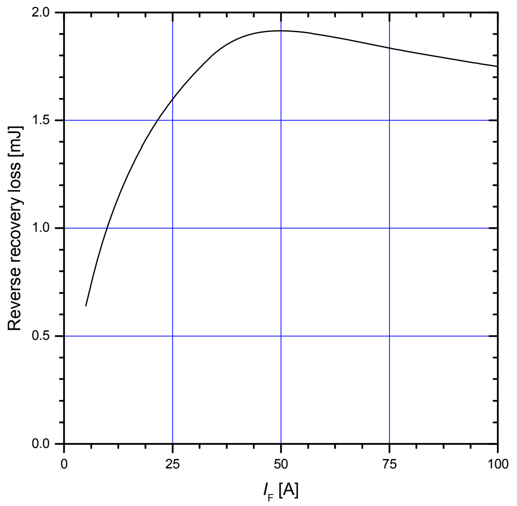
Graph 13
Typical forward characteristics of FWD



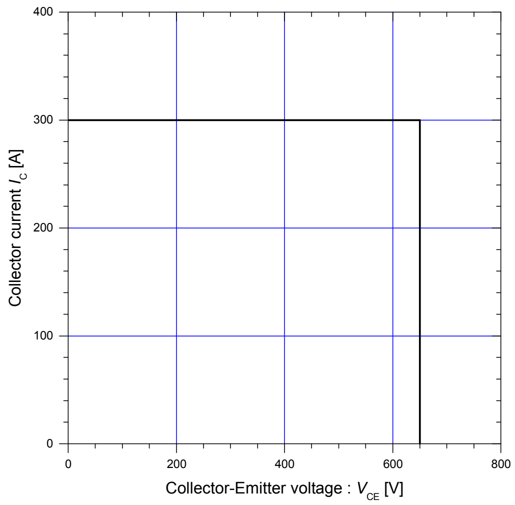
Graph 14
Typical reverse recovery characteristics vs. I_F
V_{CC} = 400 V, V_{GE} = 15 V, R_G = 10 Ω, T_{vj} = 150 °C



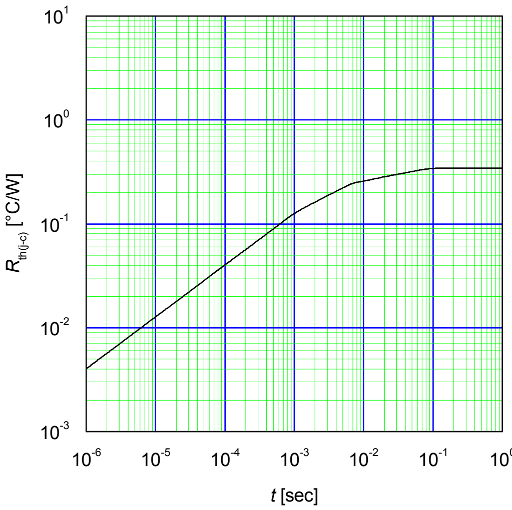
Graph 15
Typical reverse recovery loss vs. I_F
V_{CC} = 400 V, V_{GE} = 15 V, R_G = 10 Ω, T_{vj} = 150 °C



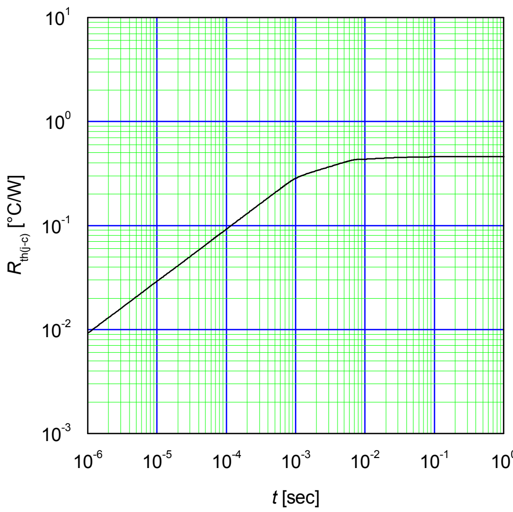
Graph 16
Reverse biased safe operating area
V_{GE} = 15 V / 0 V, R_G = 10 Ω, T_{vj} ≤ 175 °C



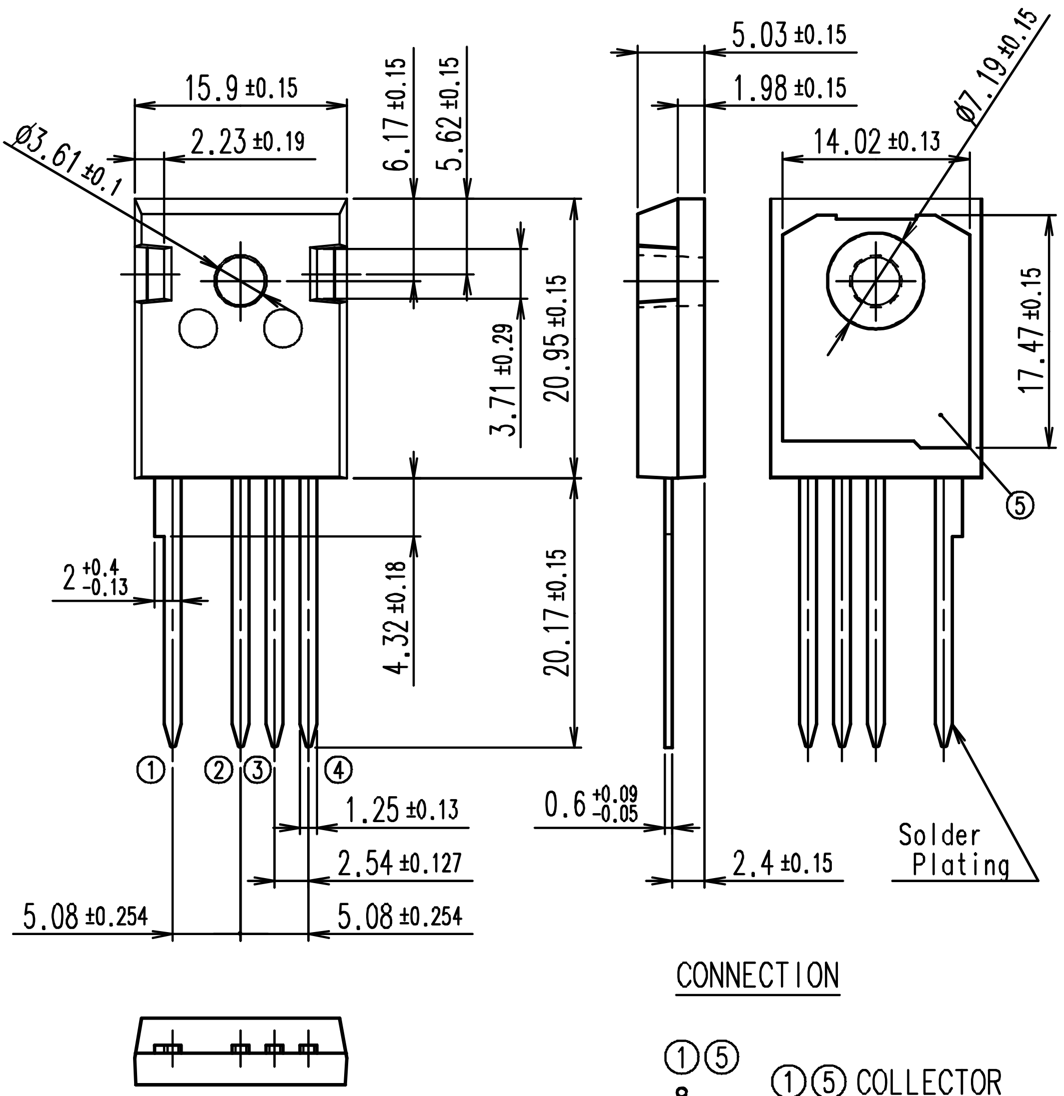
Graph 17
Transient Thermal Impedance of IGBT
D = 0



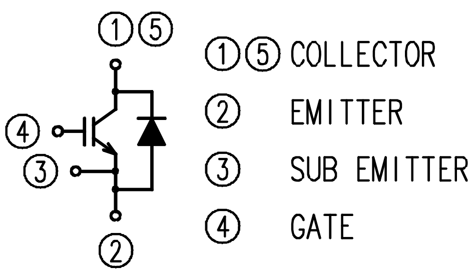
Graph 18
Transient Thermal Impedance of FWD
D = 0



Outline Drawings, mm



CONNECTION



WARNING

1. This Catalog contains the product specifications, characteristics, data, materials, and structures as of October 2018. The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this Catalog, be sur to obtain the latest specifications.

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4. The products introduced in this Catalog are intended for use in the following electronic and electrical equipment which has normal reliability requirements.
   - Computers
   - OA equipment
   - Communications equipment (terminal devices)
   - Measurement equipment
   - Machine tools
   - Audiovisual equipment
   - Electrical home appliances
   - Personal equipment
   - Industrial robots etc.

5. If you need to use a product in this Catalog for equipment requiring higher reliability than normal, such as for the equipment listed below, it is imperative to contact Fuji Electric Co., Ltd. to obtain prior approval. When using these products for such equipment, take adequate measures such as a backup system to prevent the equipment from malfunctioning even if a Fuji's product incorporated in the equipment becomes faulty.
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   - Trunk communications equipment
   - Traffic-signal control equipment
   - Gas leakage detectors with an auto-shut-off feature
   - Emergency equipment for responding to disasters and anti-burglary devices
   - Safety devices
   - Medical equipment

6. Do not use products in this Catalog for the equipment requiring strict reliability such as the following and equivalents to strategic equipment (without limitation).
   - Space equipment
   - Aeronautic equipment
   - Nuclear control equipment
   - Submarine repeater equipment

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IGBT Modules

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