FGW25N120WD

Discrete IGBT

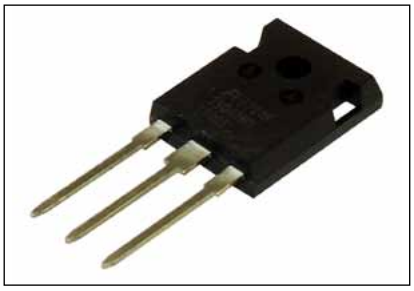
Discrete IGBT (High-Speed V series)
1200V / 25A

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



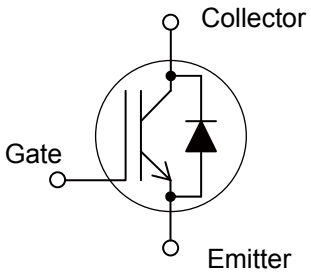
Maximum Ratings and Characteristics

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

Items	Symbols	Characteristics	Units	Remarks
Collector-Emitter voltage	V_{CES}	1200	V	
Gate-Emitter voltage	V_{GES}	±20	V	
DC Collector Current	$I_{C@25}$	40	A	T_C=25°C, T_j=150°C
	$I_{C@100}$	25	A	T_C=100°C, T_j=150°C
Pulsed Collector Current	I_{CP}	100	A	Note *1
Turn-Off Safe Operating Area	-	100	A	V_{CE}≤1200V, T_j≤175°C
Diode Forward Current	$I_{F@25}$	22	A	
	$I_{F@100}$	12	A	
Diode Pulsed Current	I_{FP}	100	A	Note *1
Short Circuit Withstand Time	t_{SC}	5	μs	V_{CC}≤600V, V_{GE}=15V T_j≤150°C
IGBT Max. Power Dissipation	P_{D_IGBT}	220	W	T_C=25°C
FWD Max. Power Dissipation	P_{D_FWD}	75		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 Tjmax.

Equivalent circuit



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

Description	Symbols	Conditions		Characteristics min.	typ.	max.	Unit
Zero Gate Voltage Collector Current	I_{CES}	V_{CE} = 1200V, 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 = 25mA		5.0	6.0	7.0	V
Collector-Emitter Saturation Voltage	$V_{CE\ (sat)}$	V_{GE} = 15V, I_C = 25A	T_j=25°C	1.4	2.0	2.6	V
			T_j=175°C	-	2.6	-	
Input Capacitance	C_{ies}	V_{CE}=25V		825	1650	2475	pF
Output Capacitance	C_{oes}	V_{GE}=0V		37	75	113	
Reverse Transfer Capacitance	C_{res}	f=1MHz		11	23	35	
Gate Charge	Q_G	V_{CC} = 400V I_C = 25A V_{GE} = 15V		40	80	120	nC
Turn-On Delay Time	$t_{d(on)}$	T_j = 25°C		14	28	42	ns
Rise Time	t_r	V_{CC} = 600V		16	32	48	
Turn-Off Delay Time	$t_{d(off)}$	I_C = 25A		61	122	183	
Fall Time	t_f	V_{GE} = 15V		16	32	48	
Turn-On Energy	E_{on}	R_G = 10Ω		0.45	0.9	1.35	mJ
Turn-Off Energy	E_{off}	L = 500μH Energy loss include “tail” and FWD (FDRW12S120J) reverse recovery.		0.65	1.3	1.95	
Turn-On Delay Time	$t_{d(on)}$	T_j = 150°C		14	28	42	ns
Rise Time	t_r	V_{CC} = 600V		16	32	48	
Turn-Off Delay Time	$t_{d(off)}$	I_C = 25A		89	178	267	
Fall Time	t_f	V_{GE} = 15V		30	60	90	
Turn-On Energy	E_{on}	R_G = 10Ω		0.75	1.5	2.25	mJ
Turn-Off Energy	E_{off}	L = 500μH Energy loss include “tail” and FWD (FDRW12S120J) reverse recovery.		1.1	2.2	3.3	
Forward Voltage Drop	V_F	I_F=12A	T_j=25°C	1.3	2.2	2.8	V
			T_j=175°C	1.0	1.8	2.6	V
Diode Reverse Recovery Time	t_{rr1}	V_{CC}=30V I_F = 1.2A -di/dt=200A/μs		16.5	33	42	ns
Diode Reverse Recovery Time	t_{rr2}	V_{CC}=600V I_F=12A		0.12	0.30	0.48	μs
Diode Reverse Recovery Charge	Q_{rr}	-di_F/dt=200A/μs T_j=25°C		0.24	0.60	0.96	μC

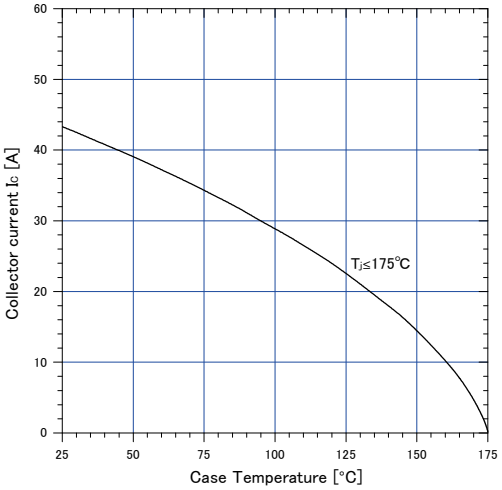
Description	Symbols	Conditions	Characteristics			Unit
			min.	typ.	max.	
Diode Reverse Recovery Time	t_{rr2}	V_{CC}=600V I_F=12A	0.22	0.55	0.88	µs
Diode Reverse Recovery Charge	Q_{rr}	-di_F/dt=200A/µs T_j=175°C	1.2	3.0	4.8	µC

● **Thermal resistance**

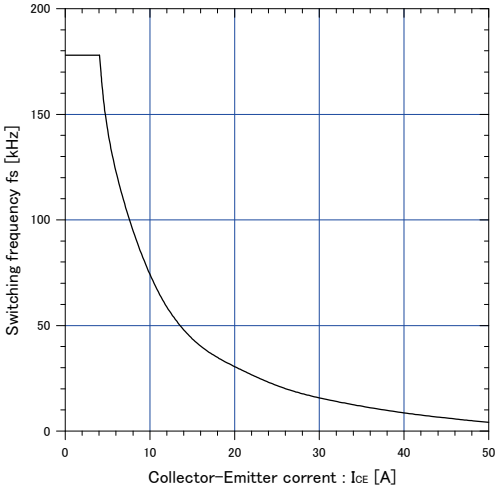
Items	Symbols	Characteristics			Unit
		min.	typ.	max.	
Thermal Resistance, Junction-Ambient	$R_{th(j-a)}$	-	-	50	°C/W
Thermal Resistance, IGBT Junction to Case	$R_{th(j-c)\_IGBT}$	-	-	0.676	
Thermal Resistance, FWD Junction to Case	$R_{th(j-c)\_FWD}$	-	-	1.923	

■ Characteristics (Representative)

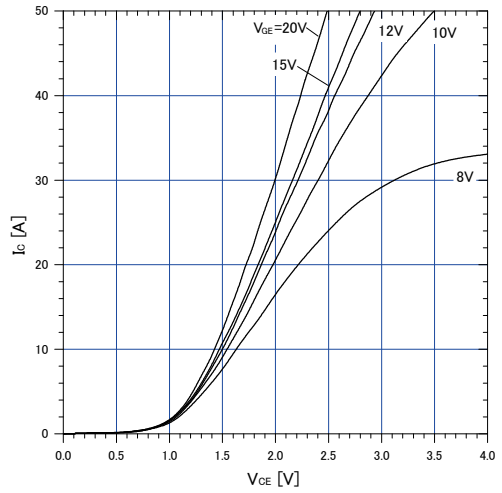
Graph.1
DC Collector Current vs T_C
V_{GE}≥+15V, T_j≤175°C



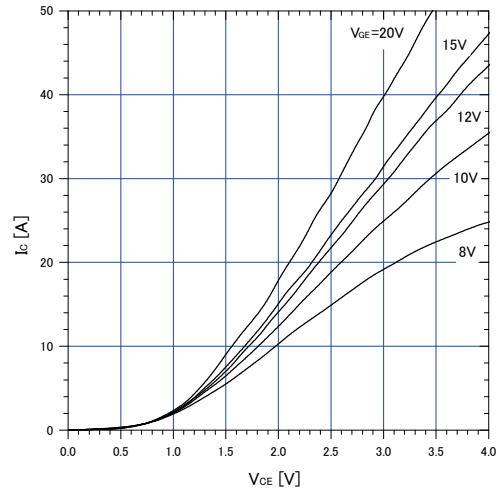
Graph.2
Collector Current vs. switching frequency
V_{GE}=+15V, T_C≤175°C, V_{CC}=600V, D=0.5,
R_G=10Ω, T_C=100°C



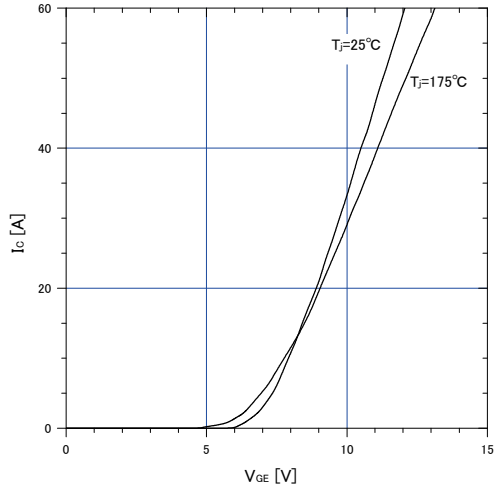
Graph.3
Typical Output Characteristics (V_{CE}-I_C)
T_j=25°C



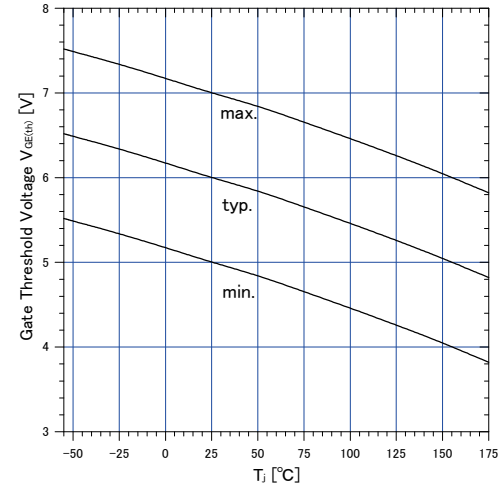
Graph.4
Typical Output Characteristics (V_{CE}-I_C)
T_j=175°C



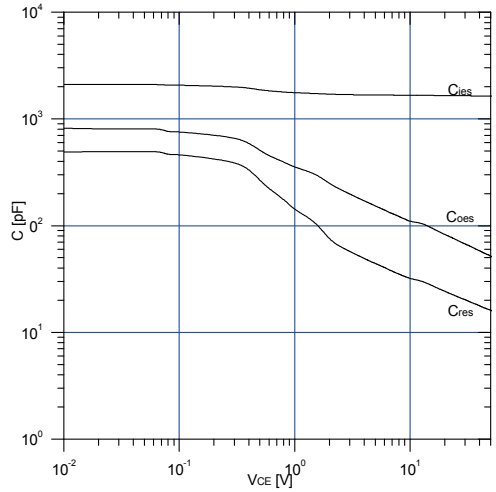
Graph.5
Typical Transfer Characteristics
V_{CE}=+15V



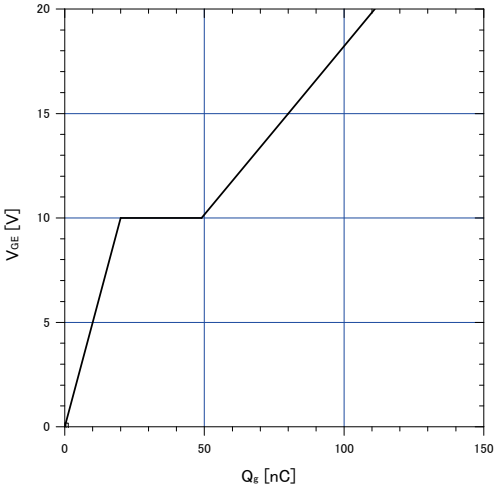
Graph.6
Gate Threshold Voltage vs. T_j
I_C=25mA, V_{CE}=20V



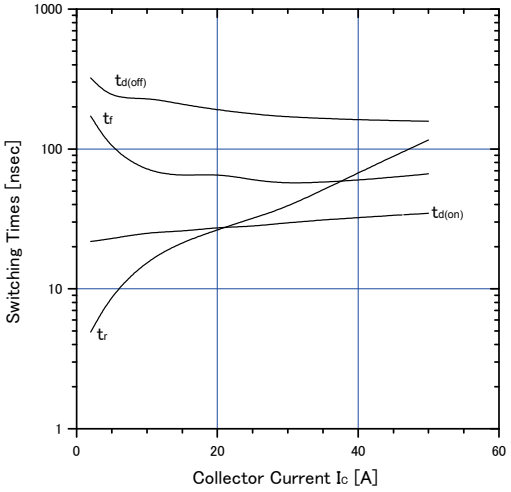
Graph.7
Typical Capacitance
V_{GE}=0V, f=1MHz, T_j=25°C



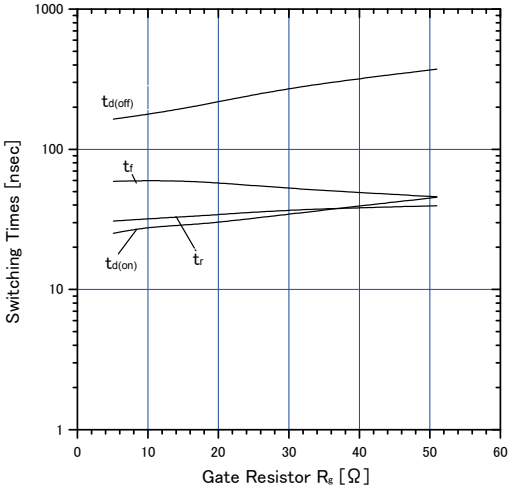
Graph.8
Typical Gate Charge
V_{CC}=600V, I_C=25A, T_j=25°C



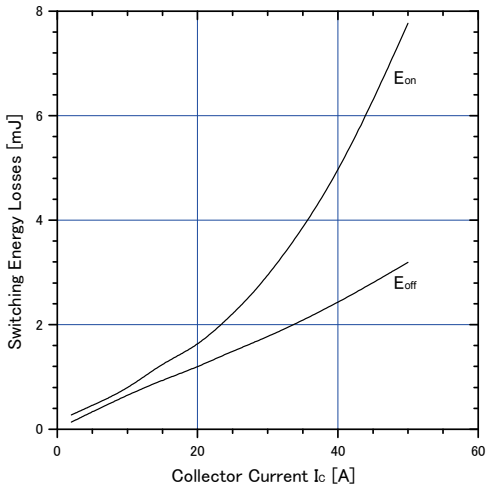
Graph.9
Typical switching time vs. I_C
T_j=175°C, V_{CC}=600V, L=500µH
V_{GE}=15V,R_G=10Ω



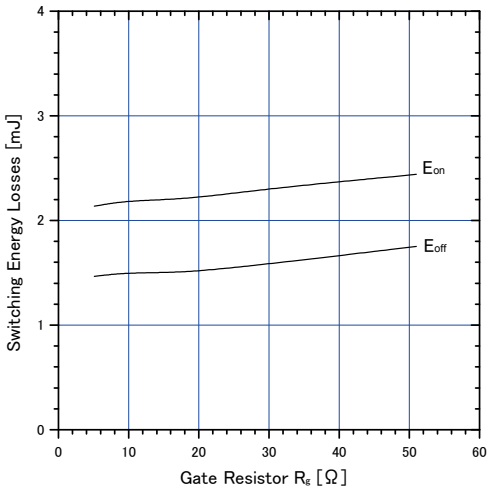
Graph.10
Typical switching time vs. R_G
T_j=175°C, V_{CC}=600V, I_C=25A, L=500µH
V_{GE}=15V



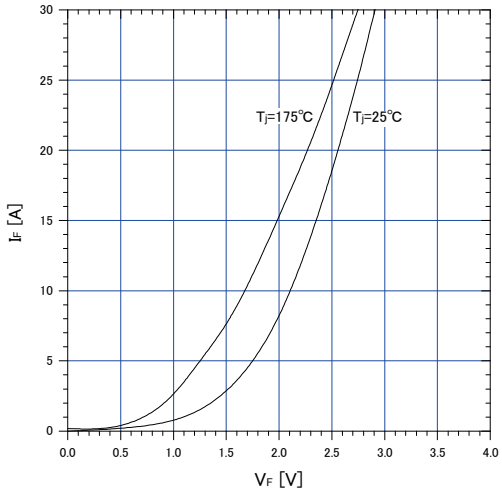
Graph.11
Typical switching losses vs. I_C
T_j=175°C, V_{CC}=600V, L=500µH
V_{GE}=15V, R_G=10Ω



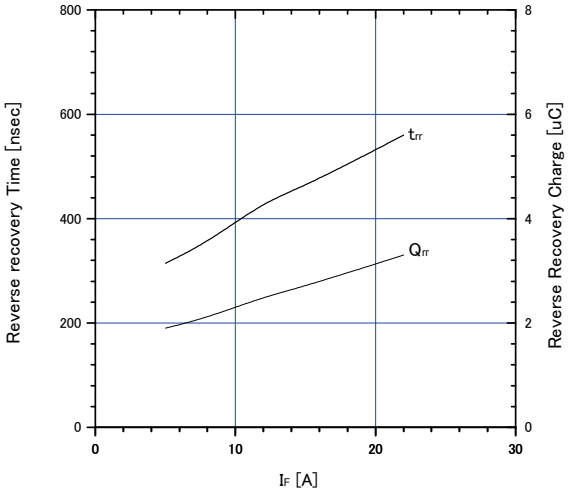
Graph.12
Typical switching losses vs. R_G
T_j=175°C, V_{CC}=600V, I_C=40A, L=500µH
V_{GE}=15V



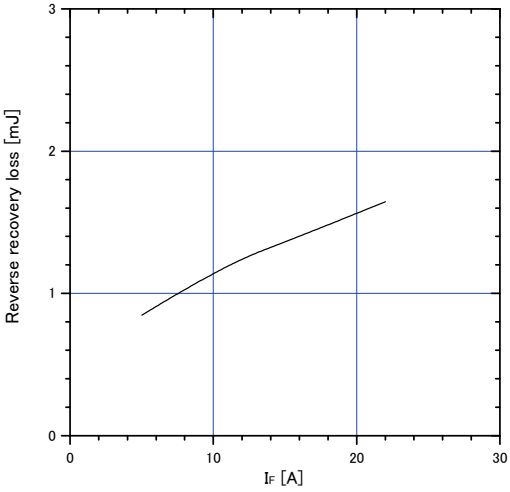
Graph.13
FWD Forward voltage drop (V_F-I_F)



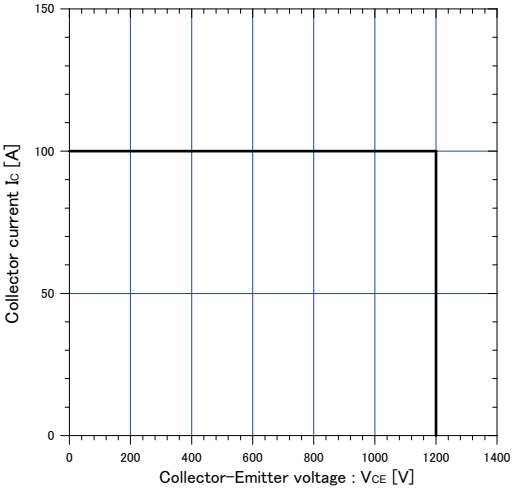
Graph.14
Typical reverse recovery characteristics vs. I_F
T_J=175°C, V_{CC}=600V, L=500μH,
V_{GE}=15V,R_G=10Ω



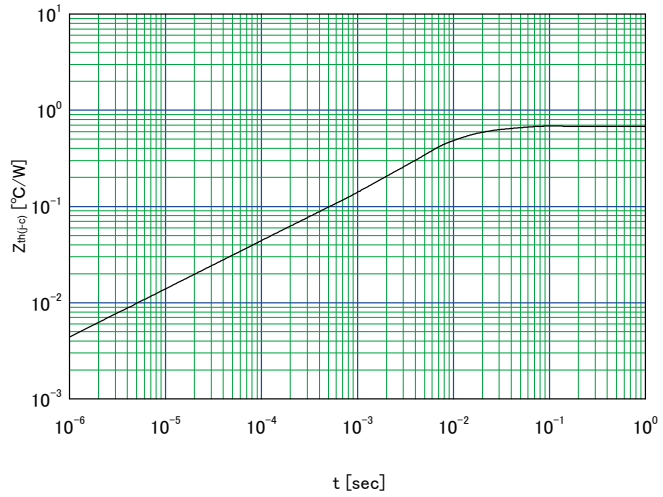
Graph.15
Typical reverse recovery loss vs. I_F
T_J=175°C,V_{CC}=600V,L=500μH
V_{GE}=15V,R_G=10Ω



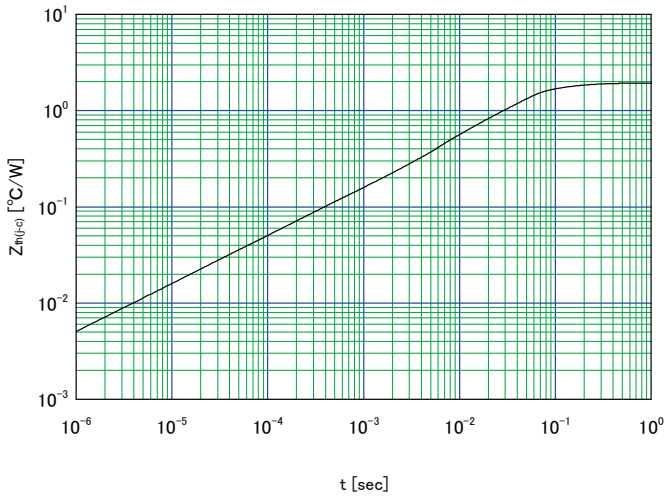
Graph.16
Reverse biased Safe Operating Area
T_J≦175°C,V_{GE}=+15V/0V,R_G=10Ω



Graph.17
Transient thermal resistance of IGBT

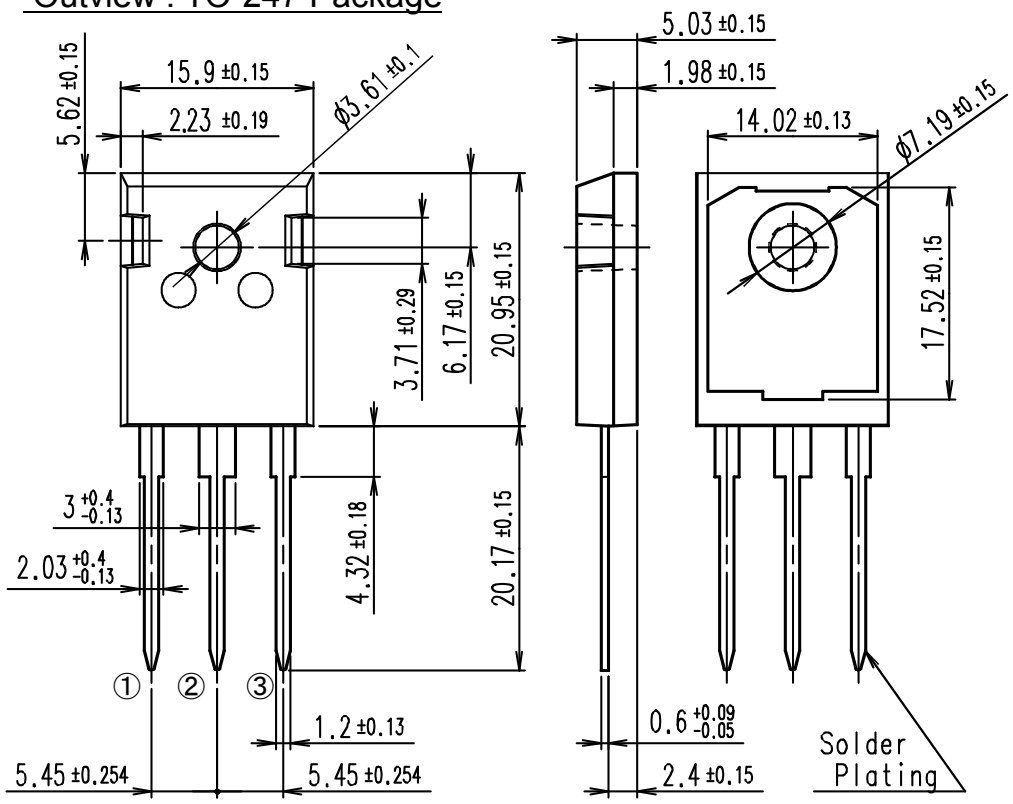


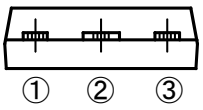
Graph.18
Transient thermal resistance of FWD



■ Outline Drawings, mm

Outview : TO-247 Package





CONNECTION

① GATE

② COLLECTOR

③ EMITTER

DIMENSIONS ARE IN MILLIMETERS.

WARNING

1. This Catalog contains the product specifications, characteristics, data, materials, and structures as of June 2015.
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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- OA equipment
- Communications equipment (terminal devices)
- Measurement equipment
- Machine tools
- Audiovisual equipment
- Electrical home appliances
- Personal equipment
- Industrial robots etc.

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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

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- Aeronautic equipment
- Nuclear control equipment
- Submarine repeater equipment

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