

FGW25N120WE

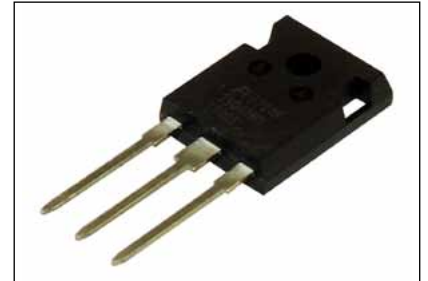
Discrete IGBT (High-Speed W series) 1200V / 25A

Features

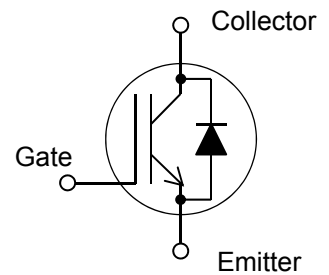
- Low power loss
- Low switching surge and noise
- High reliability, high ruggedness (RBSOA, SCSOA etc.)

Applications

- Uninterruptible power supply
- PV Power conditioner
- Inverter welding machine



Equivalent circuit



Maximum Ratings and Characteristics

Absolute Maximum Ratings at T_j=25°C (unless otherwise specified)

Items	Symbol	Characteristics	Unit	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}	40	A	
	I _{F@100}	25	A	
Diode Pulsed Current	I _{FP}	100	A	Note *1
Short Circuit Withstand Time	t _{sc}	5	μs	V _{CE} ≤600V, V _{GE} =15V T _j ≤150°C
IGBT Max. Power Dissipation	P _{D_IGBT}	270	W	T _c =25°C
FWD Max. Power Dissipation	P _{D_FWD}	125	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}.

Electrical characteristics at T_j = 25°C (unless otherwise specified) Static Characteristics

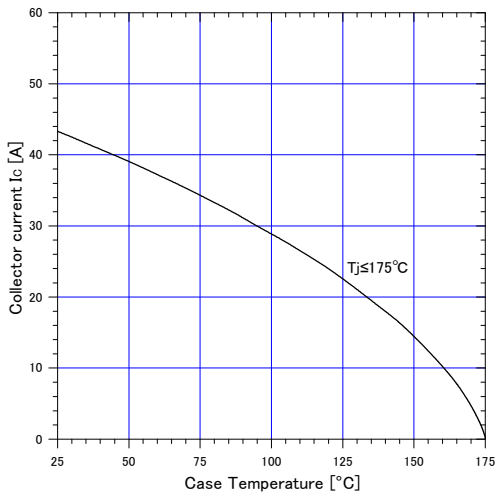
Description	Symbol	Conditions	min.	typ.	max.	Unit
Zero Gate Voltage Collector Current	I _{CEs}	V _{CE} = 1200V, V _{GE} = 0V	-	-	250	μA
			-	-	2	mA
Gate-Emitter Leakage Current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	200	nA
Gate-Emitter Threshold Voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 25mA	5.0	6.0	7.0	V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} = 15V, I _c = 25A	-	2.0	2.6	V
			-	2.6	-	
Input Capacitance	C _{ies}	V _{CE} =25V	-	1650	-	pF
Output Capacitance	C _{oes}	V _{GE} =0V	-	75	-	
Reverse Transfer Capacitance	C _{res}	f=1MHz	-	23	-	
Gate Charge	Q _G	V _{CC} = 400V I _c = 25A V _{GE} = 15V	-	80	-	nC
Turn-On Delay Time	t _{d(on)}	T _j = 25°C	-	28	-	ns
Rise Time	t _r	V _{CC} = 600V	-	44	-	
Turn-Off Delay Time	t _{d(off)}	I _c = 25A	-	122	-	
Fall Time	t _f	V _{GE} = 15V	-	32	-	
Turn-On Energy	E _{on}	R _G = 10Ω L = 500μH	-	1.3	-	mJ
Turn-Off Energy	E _{off}	Energy loss include "tail" and FWD (FDRW20S120J) reverse recovery.	-	0.9	-	
Turn-On Delay Time	t _{d(on)}	T _j = 175°C	-	28	-	ns
Rise Time	t _r	V _{CC} = 600V	-	42	-	
Turn-Off Delay Time	t _{d(off)}	I _c = 25A	-	178	-	
Fall Time	t _f	V _{GE} = 15V	-	60	-	
Turn-On Energy	E _{on}	R _G = 10Ω L = 500μH	-	2.5	-	mJ
Turn-Off Energy	E _{off}	Energy loss include "tail" and FWD (FDRW20S120J) reverse recovery.	-	1.5	-	
Forward Voltage Drop	V _F	I _F =25A	-	2.30	3.22	V
			-	2.00	-	V
Diode Reverse Recovery Time	t _{rr}	V _{CC} =600V I _F = 25A	-	0.38	-	ns
Diode Reverse Recovery Charge	Q _{rr}	-di/dt=600A/μs T _j =25°C	-	1.6	-	μC
Diode Reverse Recovery Time	t _{rr}	V _{CC} =600V I _F =25A	-	0.76	-	μs
Diode Reverse Recovery Charge	Q _{rr}	-di/dt=600A/μs T _j =175°C	-	4.8	-	μC

● Thermal Resistance

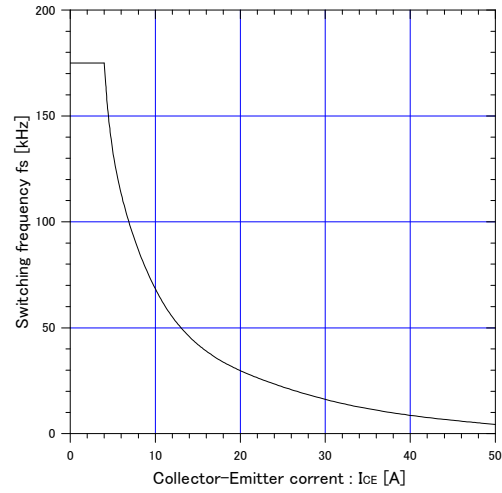
Description	Symbol	min.	typ.	max.	Unit
Thermal Resistance, Junction-Ambient	$R_{th(j-a)}$	-	-	50	°C/W
Thermal Resistance, IGBT Junction to Case	$R_{th(j-c)}_{IGBT}$	-	-	0.546	°C/W
Thermal Resistance, FWD Junction to Case	$R_{th(j-c)}_{FWD}$	-	-	1.191	°C/W

Characteristics (Representative)

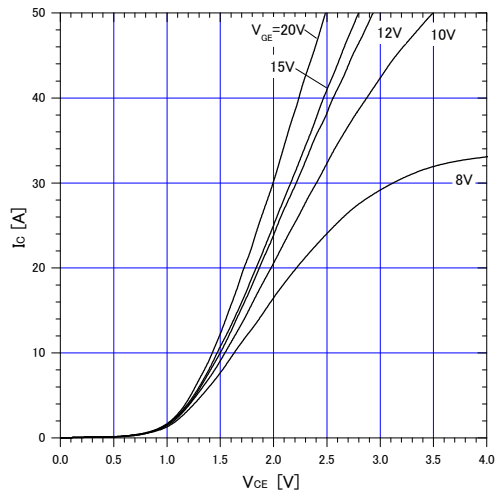
Graph.1
DC Collector Current vs Tc
 $V_{GE} \geq +15V, T_j \leq 175^\circ C$



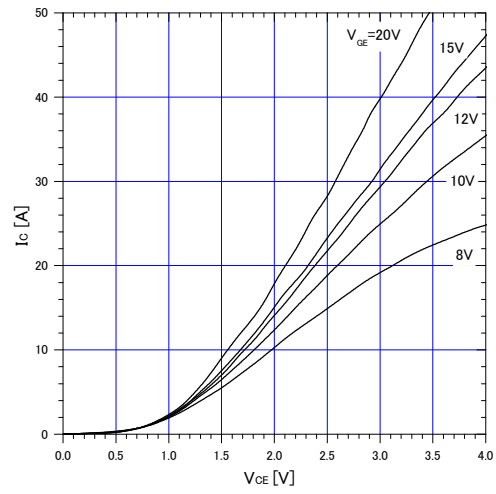
Graph.2
Collector Current vs. switching frequency
 $V_{GE} = +15V, T_c \leq 175^\circ C, V_{CC} = 600V, D = 0.5, R_G = 10\Omega, T_c = 100^\circ C$



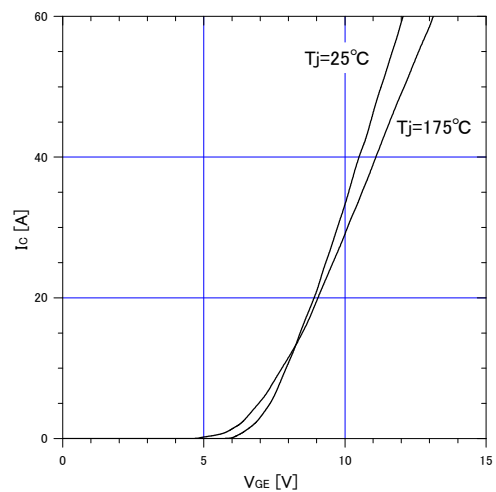
Graph.3
Typical Output Characteristics ($V_{CE}-I_C$)
 $T_j = 25^\circ C$



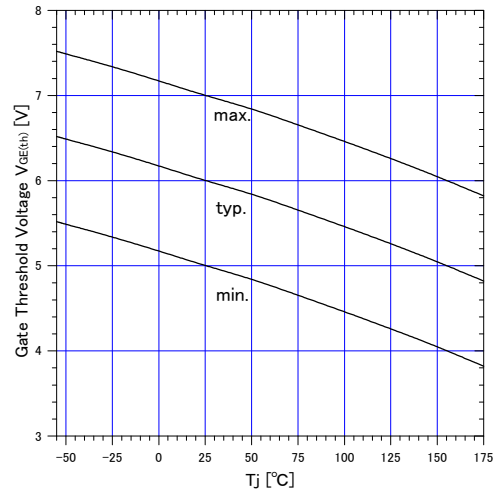
Graph.4
Typical Output Characteristics ($V_{CE}-I_C$)
 $T_j = 175^\circ C$



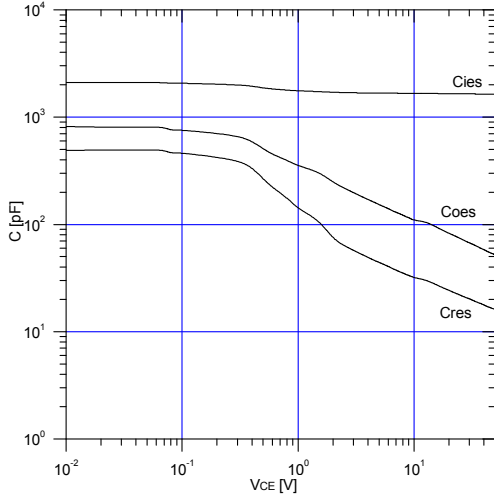
Graph.5
Typical Transfer Characteristics
 $V_{CE} = 15V$



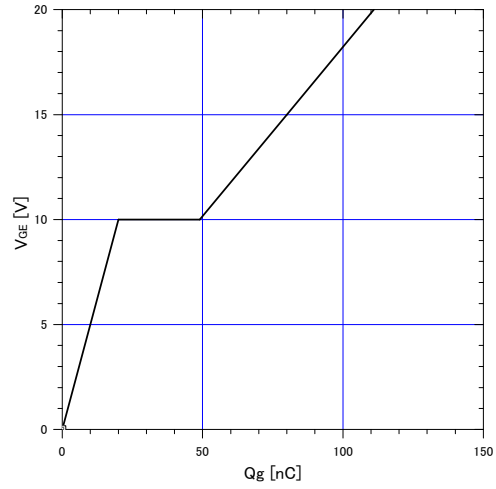
Graph.6
Gate Threshold Voltage vs. Tj
 $I_C = 25mA, V_{CE} = 20V$



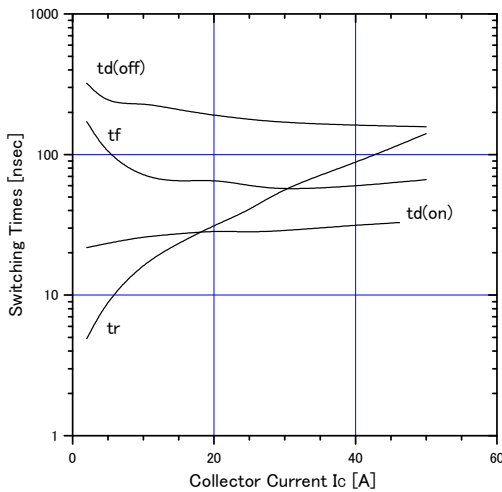
Graph.7
Typical Capacitance
 $V_{GE}=0V, f=1MHz, T_j=25^\circ C$



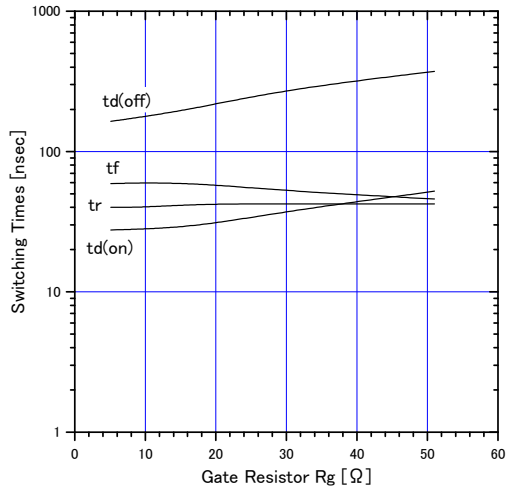
Graph.8
Typical Gate Charge
 $V_{cc}=600V, I_c=25A, T_j=25^\circ C$



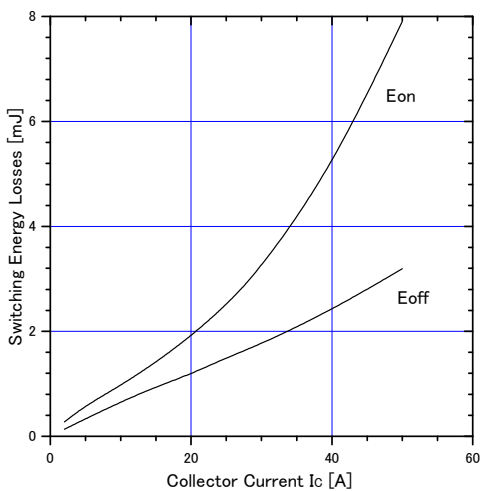
Graph.9
Typical switching time vs. Ic
 $T_j=175^\circ C, V_{cc}=600V, L=500\mu H$
 $V_{GE}=15V, R_G=10\Omega$



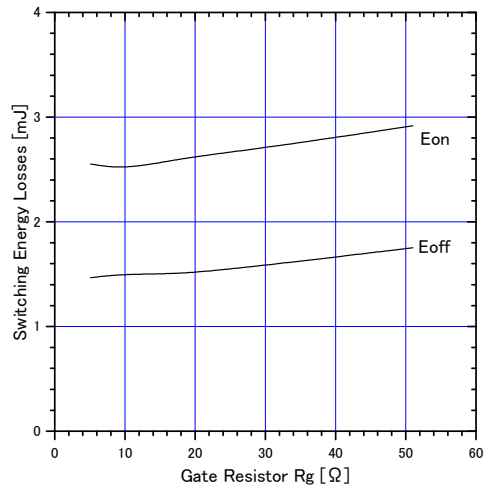
Graph.10
Typical switching time vs. Rg
 $T_j=175^\circ C, V_{cc}=600V, I_c=25A, L=500\mu H$
 $V_{GE}=15V$



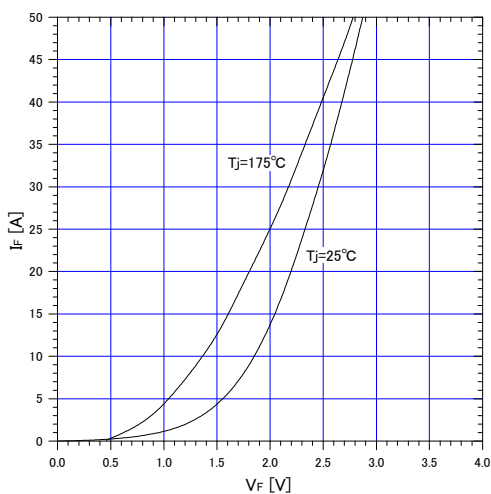
Graph.11
Typical switching losses vs. Ic
 $T_j=175^\circ C, V_{cc}=600V, L=500\mu H$
 $V_{GE}=15V, R_G=10\Omega$



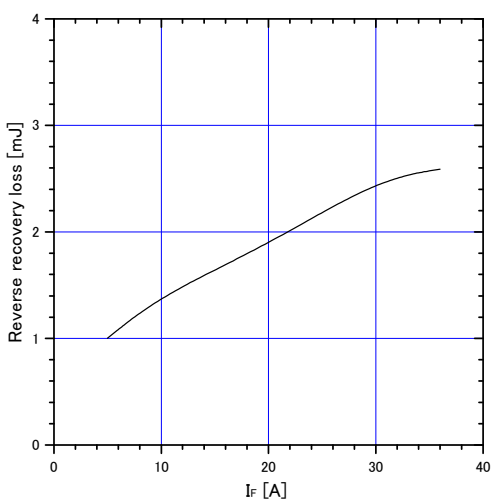
Graph.12
Typical switching losses vs. Rg
 $T_j=175^\circ C, V_{cc}=600V, I_c=25A, L=500\mu H$
 $V_{GE}=15V$



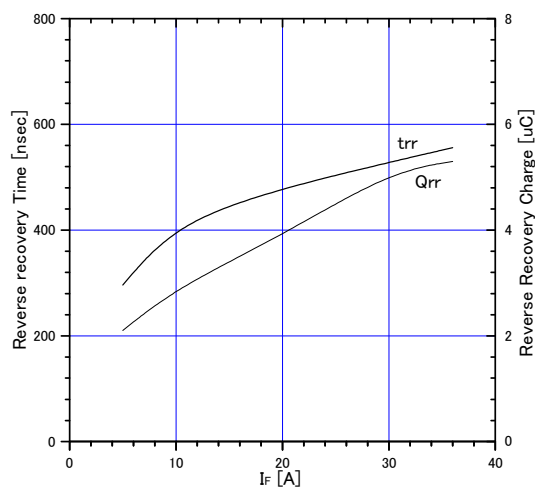
Graph.13
FWD Forward voltage drop (V_F - I_F)



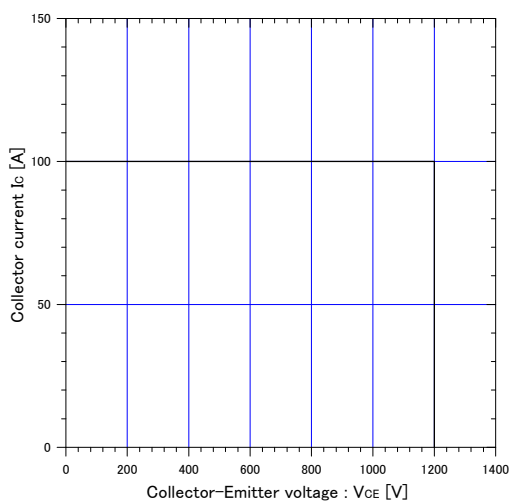
Graph.15
Typical reverse recovery loss vs. I_F
 $T_j=175^\circ\text{C}, V_{CC}=600\text{V}, L=500\mu\text{H}$
 $V_{GE}=15\text{V}, R_G=10\Omega$



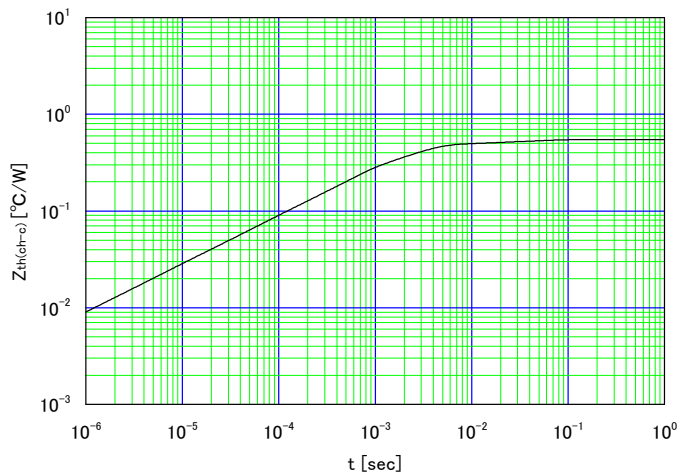
Graph.14
Typical reverse recovery characteristics vs. I_F
 $T_j=175^\circ\text{C}, V_{CC}=600\text{V}, L=500\mu\text{H}$
 $V_{GE}=15\text{V}, R_G=10\Omega$



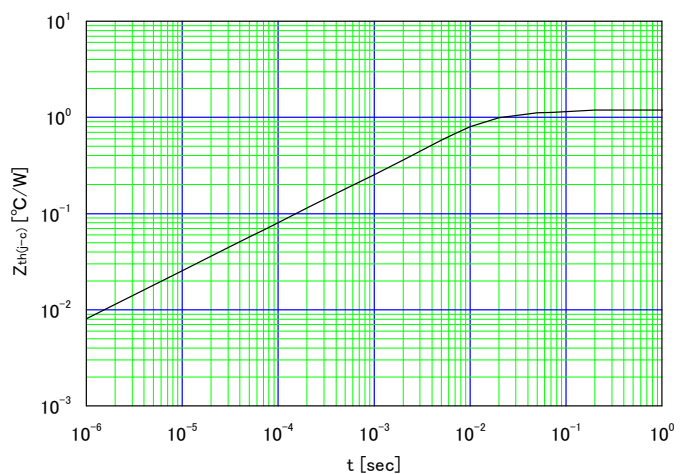
Graph.16
Reverse biased Safe Operating Area
 $T_j \leq 175^\circ\text{C}, V_{GE}=+15\text{V}/0\text{V}, R_G=10\Omega$



Graph.17
Transient thermal resistance of IGBT

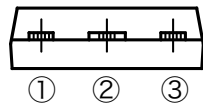
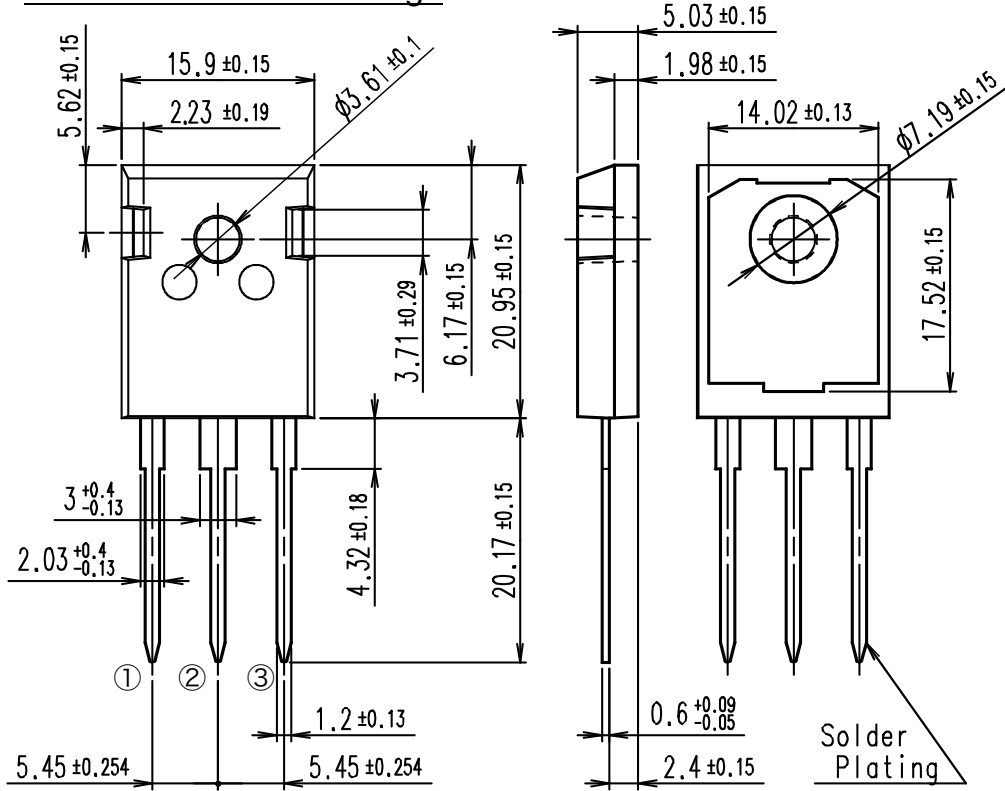


Graph.18
Transient thermal resistance of FWD



■ Outline Drawings, mm

Outview : TO-247 Package



CONNECTION

- ① GATE
- ② COLLECTOR
- ③ EMITTER

DIMENSIONS ARE IN MILLIMETERS.

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