

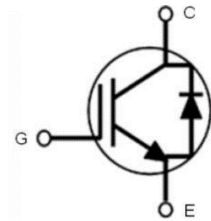
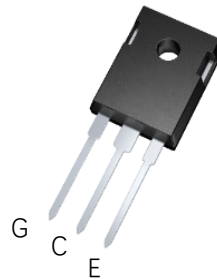
WGD40J65T1

650V 40A Trench FS Technology IGBT

Description:

This IGBT offer low $V_{CE(sat)}$, high speed switching performance and excellent quality for application such as PFC,UPS, Welder, PV Inverter, Solar Inverter and other switching applications.

TO-247



Features:

- High efficient turn-on di/dt controllability
- Low $V_{CE(sat)}$ enable high efficiencies
- Low Turn-off switching loss and softness
- Very Good EMI and High Short-Circuit Ruggedness

Applications:

- Motor Drives, Home Appliance Applications
- Fan, Pumps, Vacuum Cleaner
- Other Hard Switching Applications

Maximum Rated Valued of IGBT

Collector to Emitter Voltage	V_{CES}		650	V
Gate to Emitter Voltage	V_{GES}		± 30	V
Collector Current	I_C	$T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	80 40	A
Pulsed Collector Current	I_{CM}		160	A
Diode Continuous Forward Current	I_F	$T_C=100^\circ\text{C}$	40	A
Maximum Power Dissipation	P_D	$T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	300 150	W
Operating Junction Temperature Range	T_J		-55~+175	$^\circ\text{C}$
Storage Temperature Range	T_{STG}		-55~+175	$^\circ\text{C}$
Thermal Resistance, Junction to case for IGBT	$R_{th(J-C)}$		0.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to case for Diode	$R_{th(J-C)}$		0.7	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{th(J-A)}$		38	$^\circ\text{C/W}$

Electrical Characteristics of IGBT

				Min.	Typ.	Max.	
Collector to Emitter Breakdown Voltage	BV_{CES}	$I_C=1mA, V_{GE}=0V$	$T_C=25^\circ C$	650			V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=40A, V_{GE}=15V$ $I_C=40A, V_{GE}=15V$	$T_C=25^\circ C$		1.82	2.4	V
			$T_C=125^\circ C$		2.23		
Gate Threshold Voltage	$V_{GE(th)}$	$I_C=1mA, V_{CE}=5V$	$T_C=25^\circ C$		5.2		V
Zero Gate Voltage Collector current	I_{CES}	$V_{CE}=V_{CES}, V_{GS}=0V$	$T_C=25^\circ C$			10	μA
Gate to Emitter Leakage Current	I_{GES}	$V_{GE}=V_{GES}, V_{CE}=0V$	$T_C=25^\circ C$			± 100	nA
Input Capacitance	C_{ies}	$f=1MHz, V_{CE}=25V, V_{GE}=0V$	$T_C=25^\circ C$		5290		pF
Output Capacitance	C_{oes}				163		pF
Reverse Transfer Capacitance	C_{res}				20		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{CC}=400V, I_C=40A,$ $V_{GE}=15V, R_G=7.5ohm$	$T_C=25^\circ C$		31		ns
			$T_C=175^\circ C$		30		
Rising Time	t_r		$T_C=25^\circ C$		59		ns
			$T_C=175^\circ C$		63		
Turn-off Delay Time	$t_{d(off)}$		$T_C=25^\circ C$		131		ns
			$T_C=175^\circ C$		141		
Falling Time	t_f		$T_C=25^\circ C$		79		ns
			$T_C=175^\circ C$		137		
Turn-on Switching Loss	E_{on}		$T_C=25^\circ C$		0.75		mJ
			$T_C=175^\circ C$		0.9		
Turn-off Switching Loss	E_{off}	$T_C=25^\circ C$		0.88		mJ	
		$T_C=175^\circ C$		1.1			
Total Switching Energy	E_{total}	$T_C=25^\circ C$		1.63		mJ	
		$T_C=175^\circ C$		2.0			

Characteristics of Body Diode

				Min.	Typ.	Max.	
Diode Forward Voltage	V_F	$I_F=40A$	$T_C=25^\circ C$ $T_C=125^\circ C$		2.1 1.8	2.6	V
Diode Peak Reverse Recovery Current	I_{rr}	$I_F=40A$ $di/dt=200A/us$ $V_{CC}=400V$	$T_C=25^\circ C$		8.16		A
Diode Reverse Recovery Time	t_{rr}		$T_C=175^\circ C$		14.6		
			$T_C=25^\circ C$		128		ns
Diode Reverse Recovery Charge	Q_{rr}		$T_C=175^\circ C$		207		
		$T_C=25^\circ C$		0.6		nC	
			$T_C=175^\circ C$		1.8		

Fig.1 Typical Output Characteristics ($T_J=25^\circ\text{C}$)

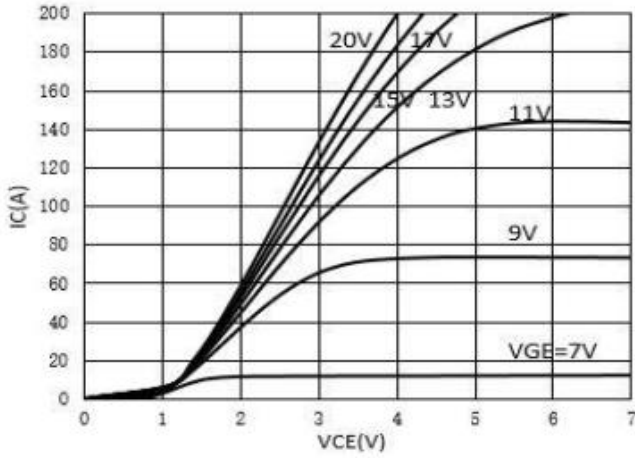


Fig.2 Typical Output Characteristics ($T_J=175^\circ\text{C}$)

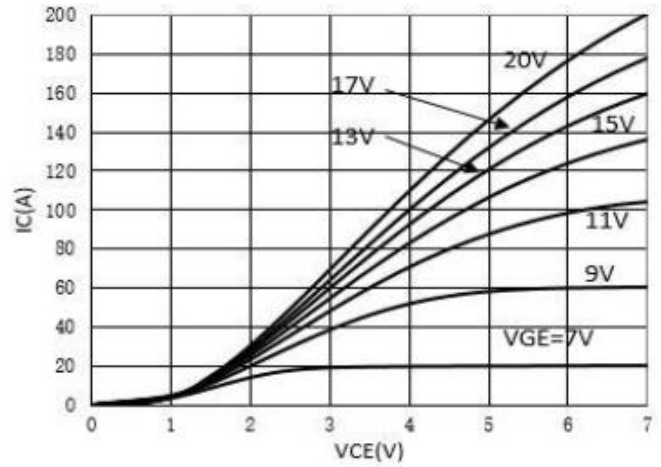


Fig.3 Transfer Characteristic

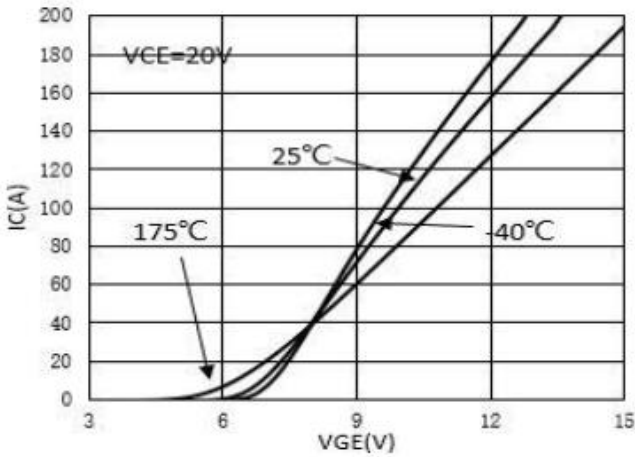


Fig.4 Diode Characteristic

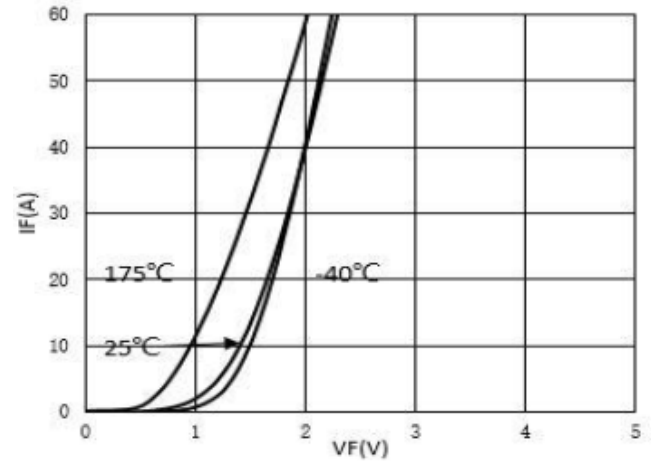


Fig.5 Collector-Emitter Saturation Voltage vs Junction Temperature

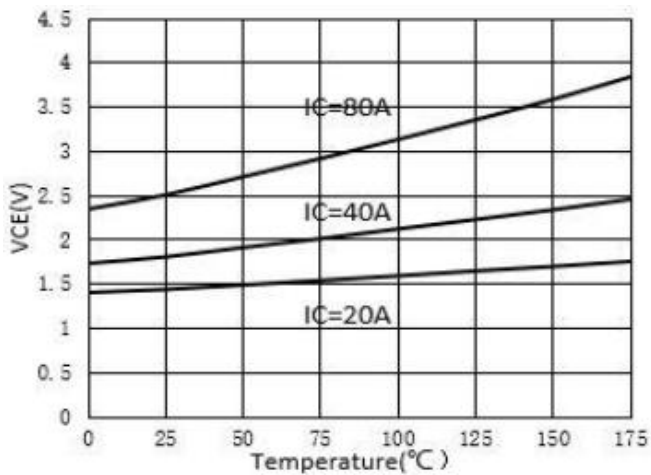


Fig.6 Diode Forward Voltage vs Junction Temperature

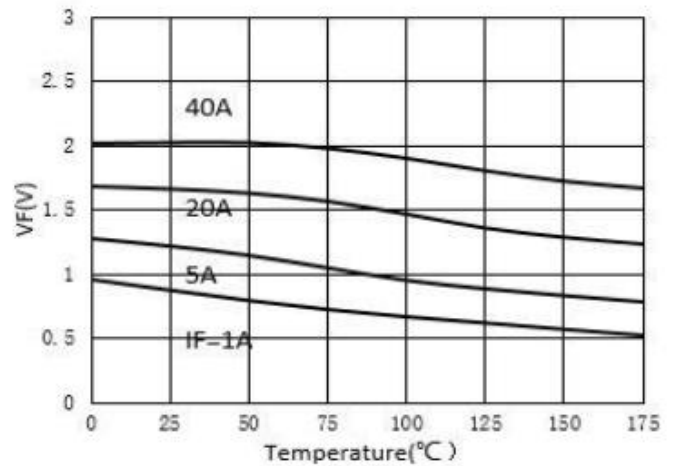


Fig.7 Gate-Charge Characteristics

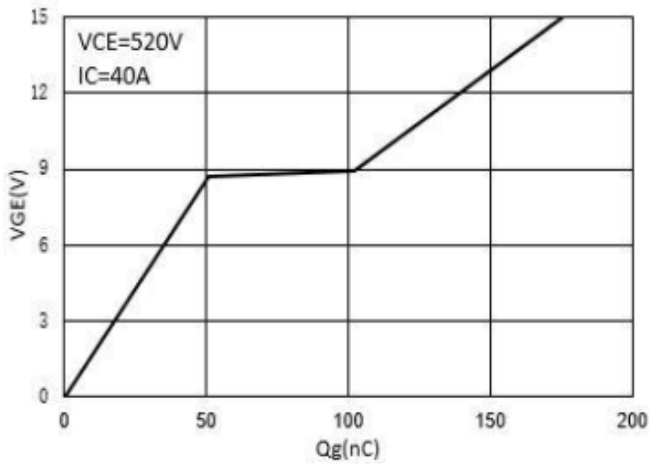


Fig.8 Capacitance Characteristics

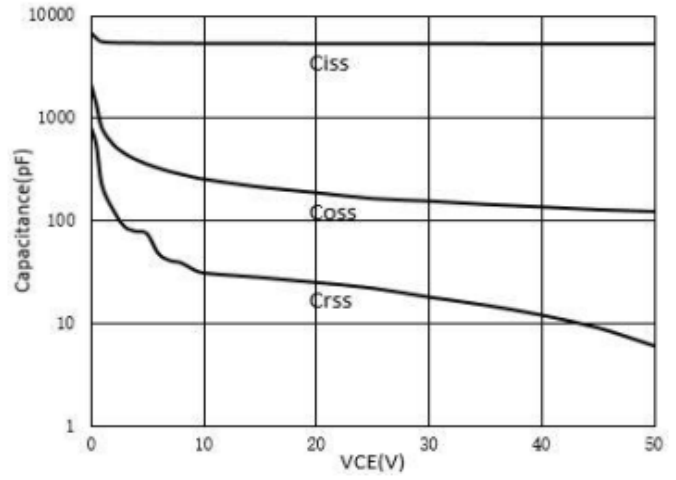


Fig.9 Power Dissipation as Function of Case

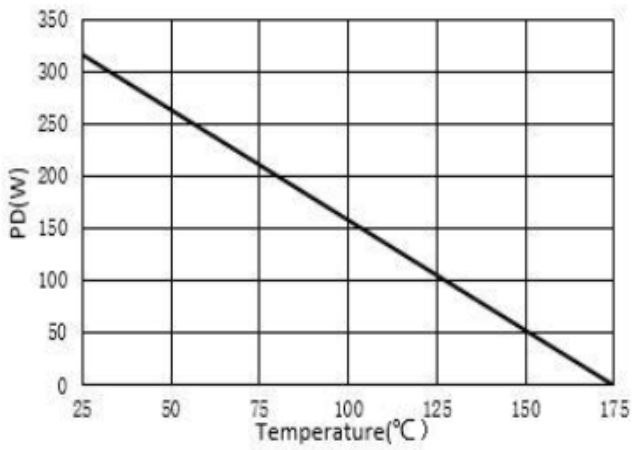


Fig.10 Current De-rating

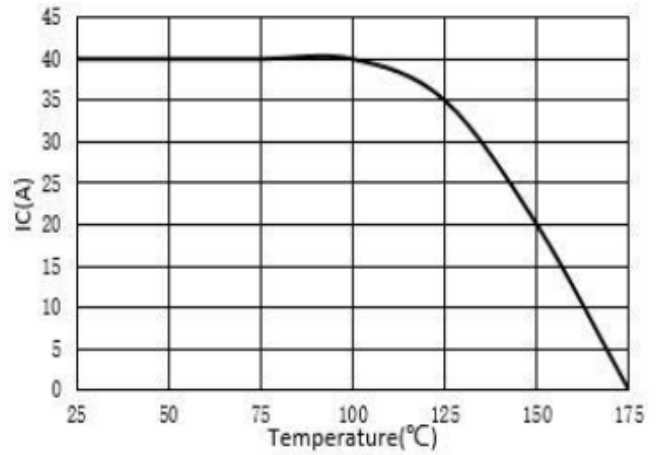


Fig.11 Diode Reverse Leakage Current vs. Junction Temperature

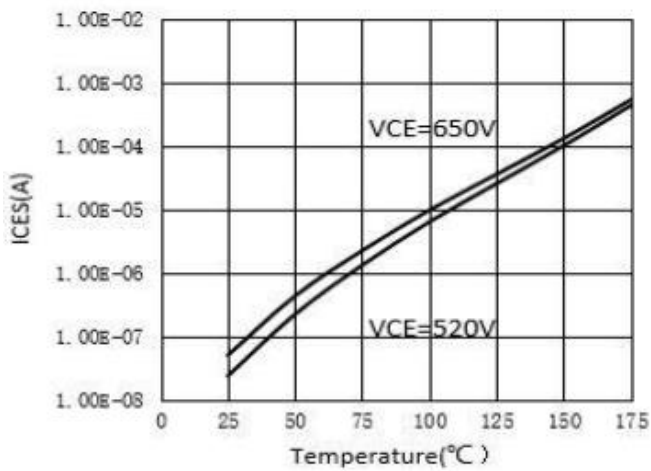


Fig.12 Switching Time vs. I_C (T_J=175°C, V_{GE}=15V, V_{CE}=400V, R_g=7.5Ω)

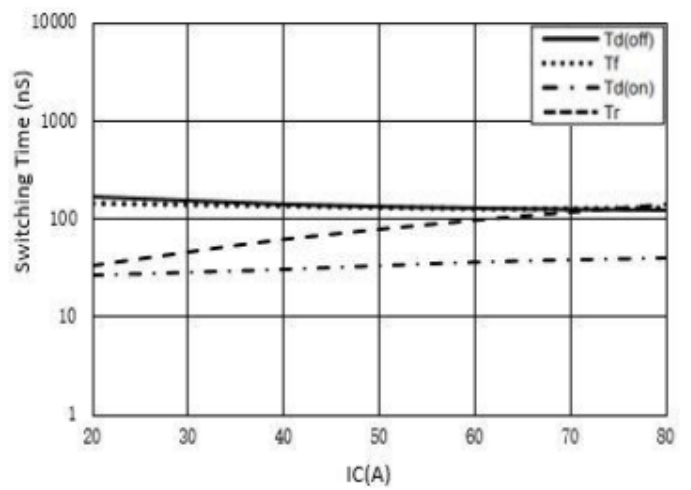


Fig.13 Switching Time vs. R_g
($T_J=175^\circ\text{C}, V_{GE}=15\text{V}, V_{CE}=400\text{V}, I_C=40\text{A}$)

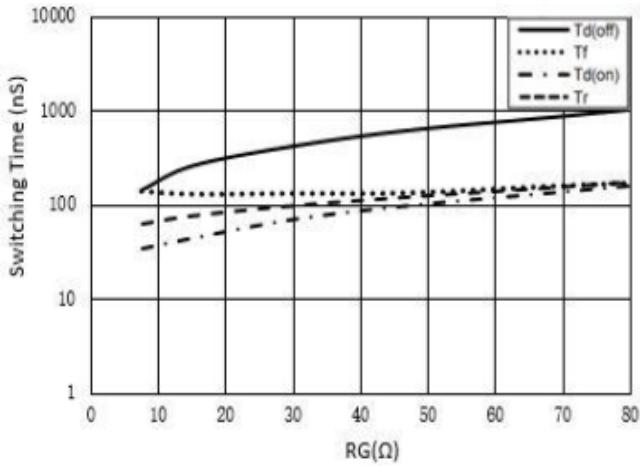


Fig.14 Switching Time vs. Junction Temperature
($V_{GE}=15\text{V}, V_{CE}=400\text{V}, I_C=40\text{A}, R_g=7.5\Omega$)

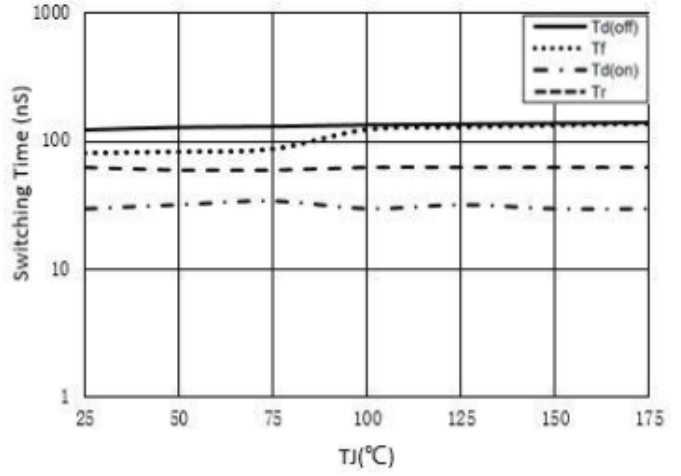


Fig.15 V_{GE} vs. Junction Temperature

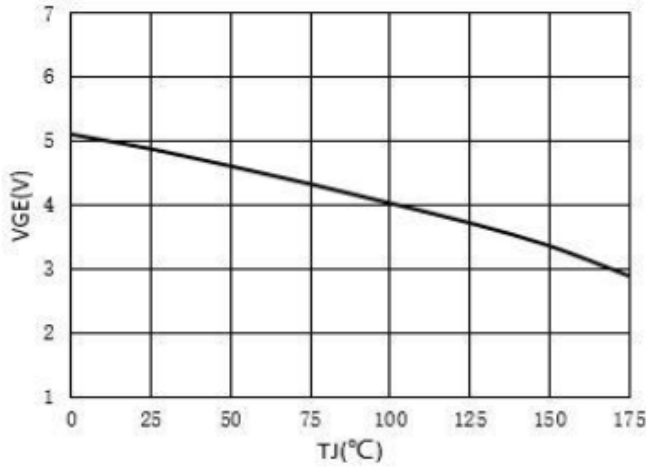


Fig.16 Switching Loss vs. I_C
($T_J=175^\circ\text{C}, V_{GE}=15\text{V}, V_{CE}=400\text{V}, R_g=7.5\Omega$)

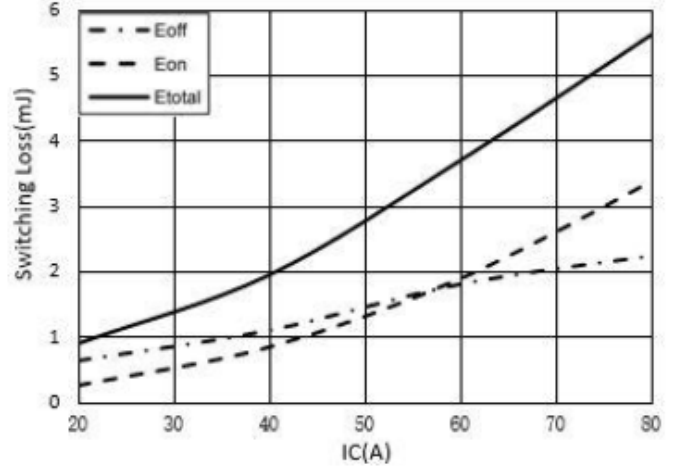


Fig.17 Switching Loss vs. R_g
($T_J=175^\circ\text{C}, V_{GE}=15\text{V}, V_{CE}=400\text{V}, I_C=40\text{A}$)

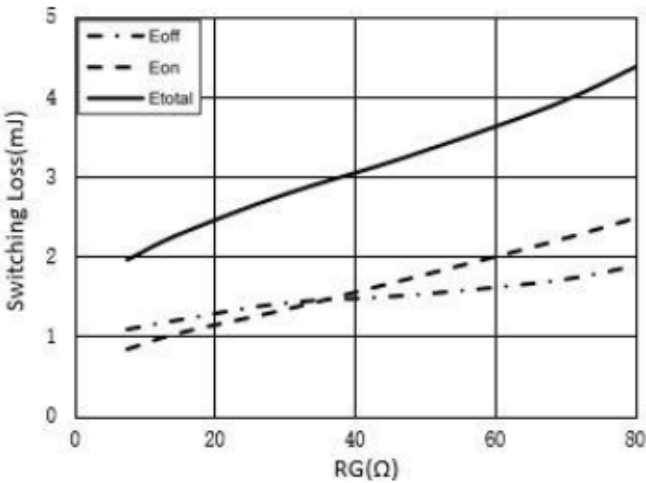


Fig.18 Diode Reverse Recovery Charge and Peak Current vs. Conduction Forward Current
($V_{GE}=15\text{V}, V_{CE}=400\text{V}, di/dt=200\text{A/us}$)

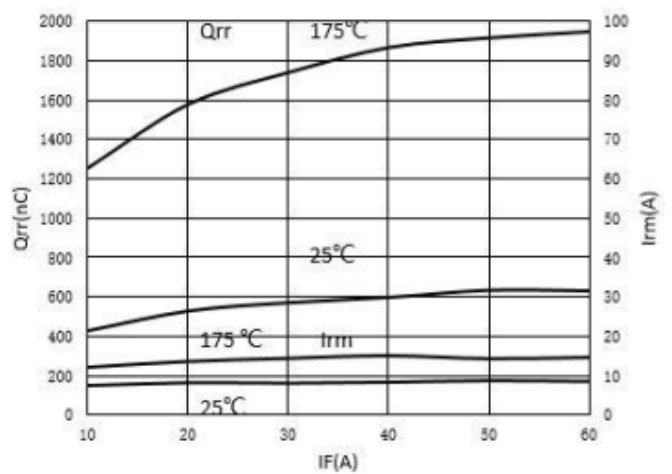


Fig.19 Transient Thermal Impedance for IGBT

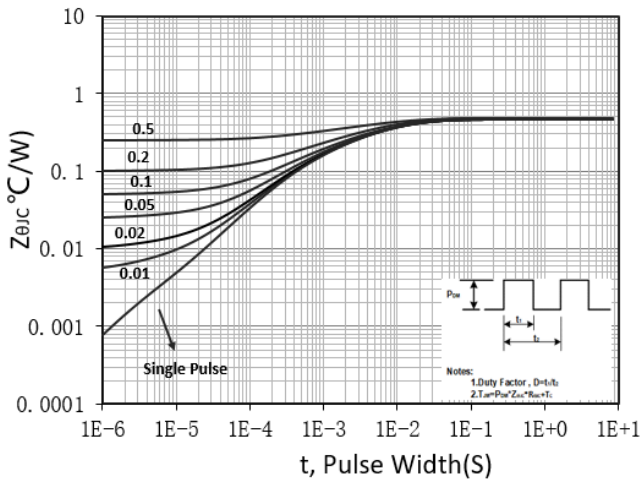
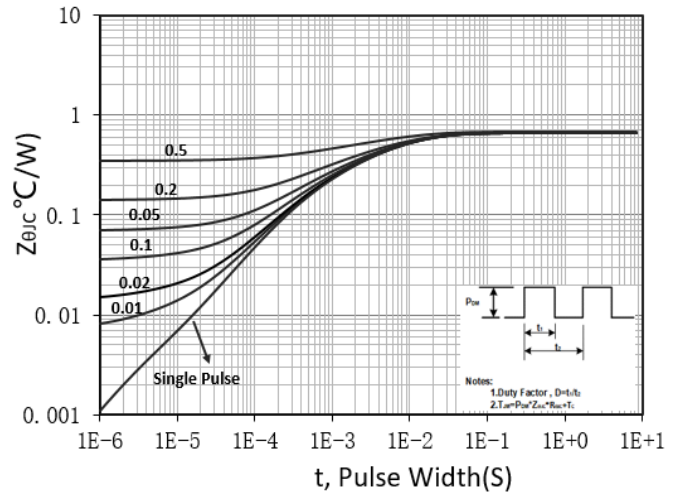
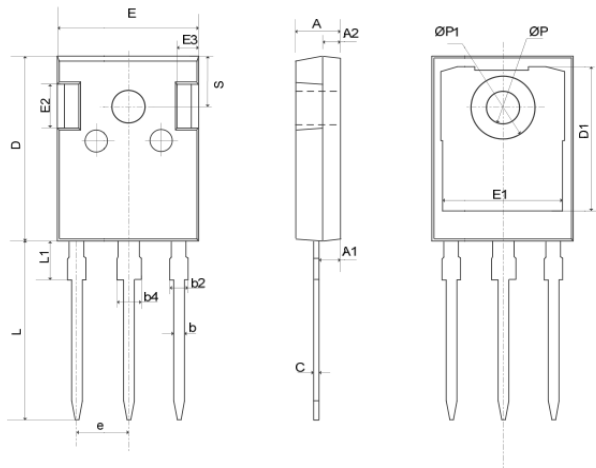


Fig.20 Transient Thermal Impedance for Diode



Mechanical Dimensions for TO-247



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.11	1.36
b2	1.91	2.21
b4	2.91	3.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.44BSC	
L	19.62	20.22
L1	—	4.30
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	

Ordering Information

Part	Package	Marking	Packing method
WGD40J65T1	TO-247	WGD40J65T1	Tube

