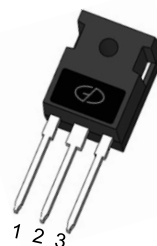


50A,650V Insulated Gate Bipolar Transistor

Features

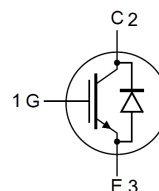
- Very low $V_{CE(sat)}$.
- Trench FS Technology offering.
- Very tight parameter distribution.
- Positive temperature coefficient in $V_{C(sat)}$.
- High ruggedness, temperature stable behavior



TO-247AD

Applications

- PFC
- Solar Converters
- Welding Converters
- Uninterruptible Power Suppliers
- Mid to High Range Switching Frequency Converters



Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	650	V
Gate-Emitter Voltage	V_{GES}	± 20	V
Transient Gate-Emitter Voltage ($t_p \leq 10\mu\text{s}$, $D < 0.01$)		± 30	
Collector Current	I_C	$T_C=25^{\circ}\text{C}$ 100	A
		$T_C=100^{\circ}\text{C}$ 50	
Collector Current, Pulsed	I_{CM}	150	A
Diode Continuous Forward Current	I_F	50	A
Power Dissipation	P_D	$T_C=25^{\circ}\text{C}$ 254	W
		$T_C=100^{\circ}\text{C}$ 127	
Operating Junction/ Storage Temperature Range	T_J/ T_{STG}	-55 to +175	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case for IGBT	R_{thJC}	0.59	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Case for Diode	R_{thJC}	0.88	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Ambient (Note 1)	R_{thJA}	40	$^{\circ}\text{C/W}$

Note 1: Device mounted on 1 square inch FR4 PCB board, with 2oz single-sided copper, in a 25°C still air environment.

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_{CE}=1mA$	650	--	--	V
Collector-Emitter Leakage Current	I_{CES}	$V_{CS}=650V, V_{GE}=0V$	--	--	5	μA
Gate Threshold Voltage	$V_{GE(TH)}$	$V_{CS}=V_{GE}, I_C=1mA$	4	4.9	6	V
Gate to Emitter Leakage Current	I_{GES}	$V_{GE}=\pm 30V, V_{CE}=0V$	--	--	± 200	nA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=50A$	--	1.86	2.1	V
		$V_{GE}=15V, I_C=50A, T_J=175^\circ\text{C}$	--	2.38	2.6	
Total Gate Charge	Q_g	$V_{GE(off)}=0V, V_{GE(on)}=15V, V_{CC}=480V, I_C=50A$	--	104	--	nC
Gate-Emitter Charge	Q_{ge}		--	11.8	--	
Gate-Collector Charge	Q_{gc}		--	32	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{CE}=400V, I_C=50A, V_{GE}=15V, R_G=10\Omega$	--	39	--	ns
Turn-on Rise Time	t_r		--	79	--	
Turn-off Delay Time	$t_{d(off)}$		--	145	--	
Turn-off Fall Time	t_f		--	52	--	
Turn-On Switching Loss	E_{on}		--	1.76	--	mJ
Turn-Off Switching Loss	E_{off}		--	1.05	--	
Total Switching Loss	E_{ts}		--	2.81	--	
Input Capacitance	C_{ies}	$V_{GE}=0V, V_{CE}=25V, f=1MHz$	--	2333	--	pF
Output Capacitance	C_{oes}		--	107	--	
Reverse Transfer Capacitance	C_{res}		--	48.6	--	

Reverse Diode Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_{FM}	$I_F=50A, V_{GE}=0V$	--	1.9	--	V
		$I_F=50A, V_{GE}=0V, T_J=175^\circ\text{C}$	--	1.65	--	
Reverse Recovery Time	T_{rr}	$I_F=50A, di/dt=500A/\mu s$	--	103	--	ns
Reverse Recovery Charge	Q_{rr}		--	692	--	nC
Peak Reverse Recovery Current	I_{rrm}		--	12	--	A

Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.1 - Output Characteristics

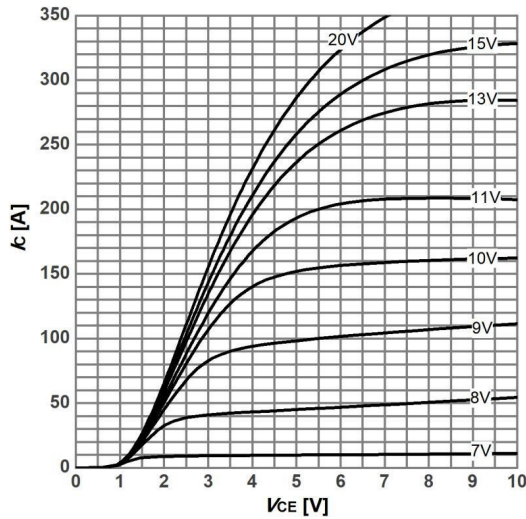


Fig.2 - Output Characteristics

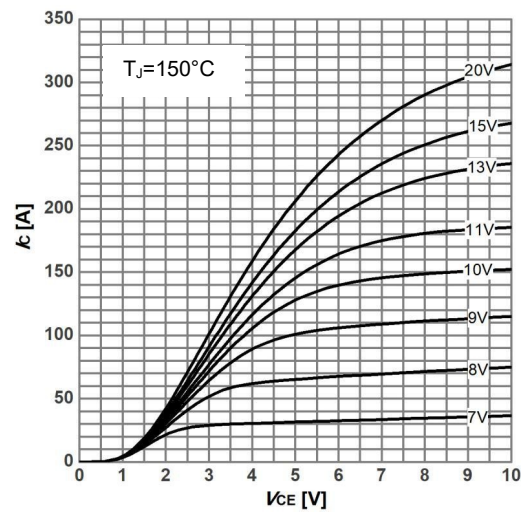


Fig.3 - Transfer Characteristics

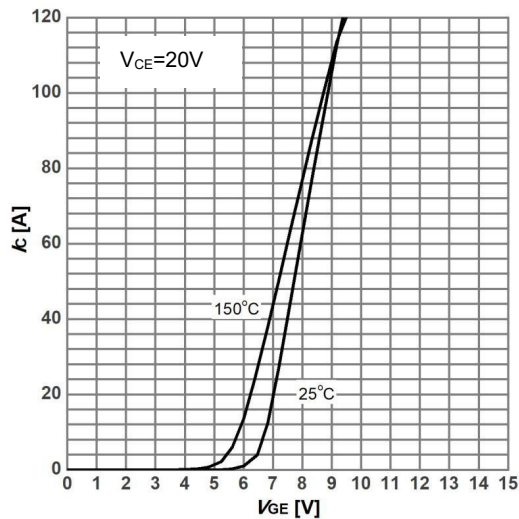


Fig.4 - Collector-Emitter Saturation Voltage

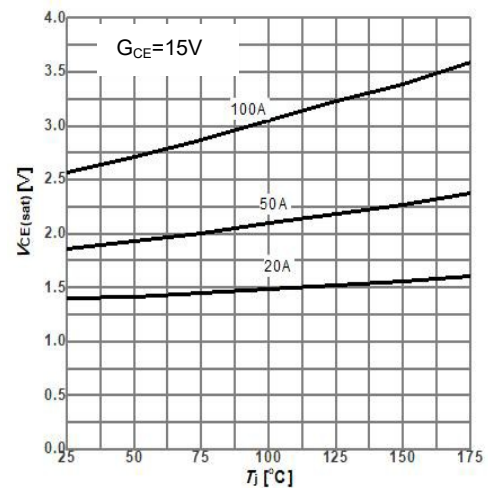


Fig.5 - Gate Threshold Voltage

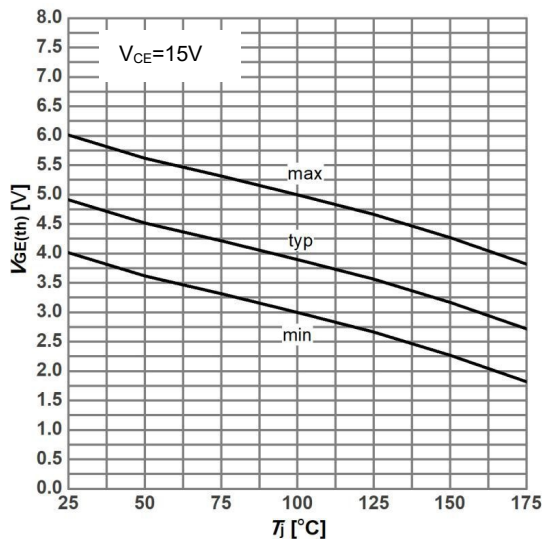
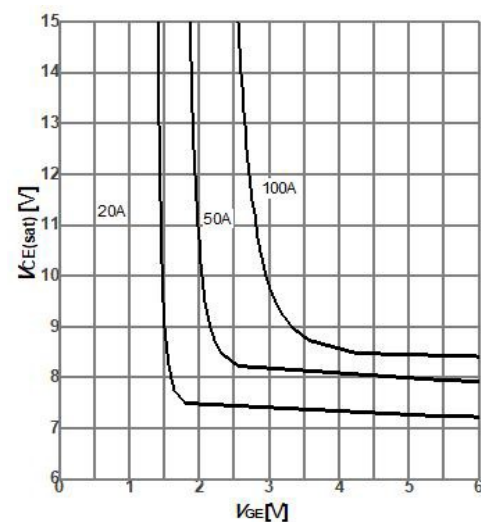


Fig.6 - Saturation Voltage as a function of Gate-Emitter Voltage



Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.7 - Capacitance

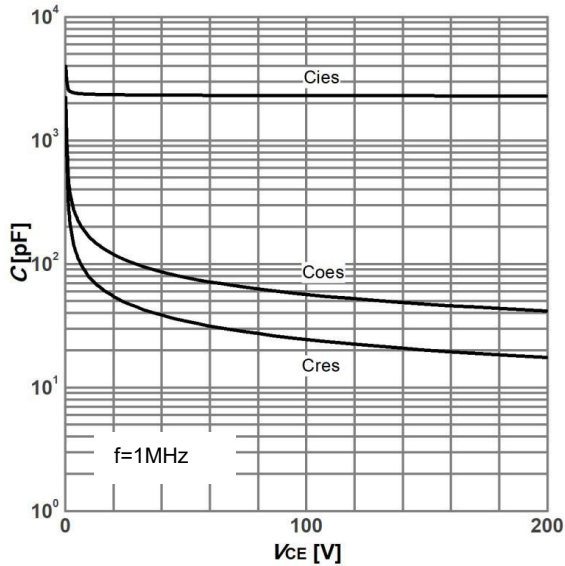


Fig.8 - Gate charge

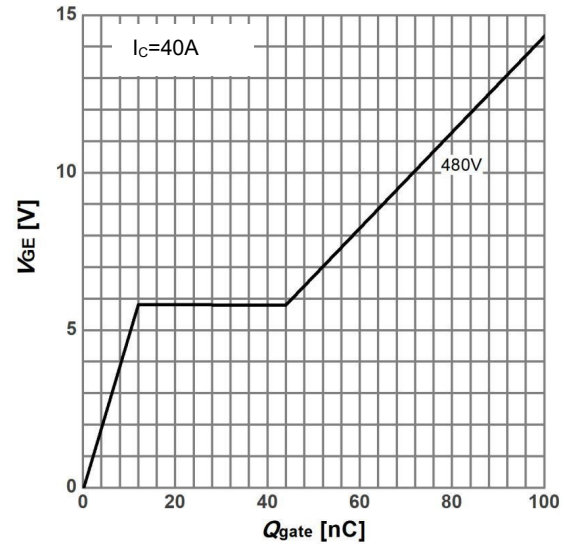


Fig.9 - Diode forward current as A function of forward voltage

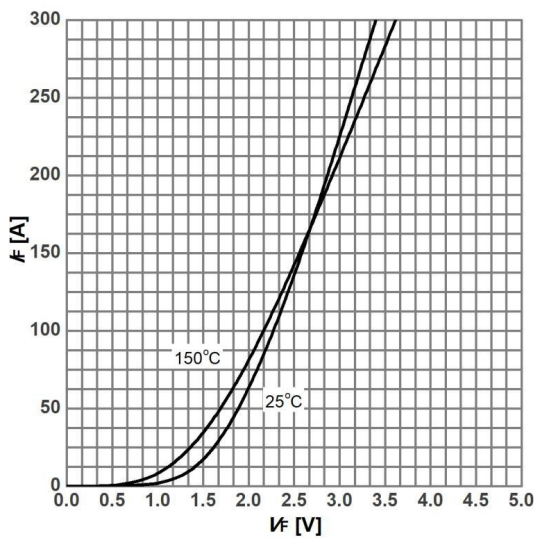


Fig.10 - Diode forward voltage as a function of junction temperature

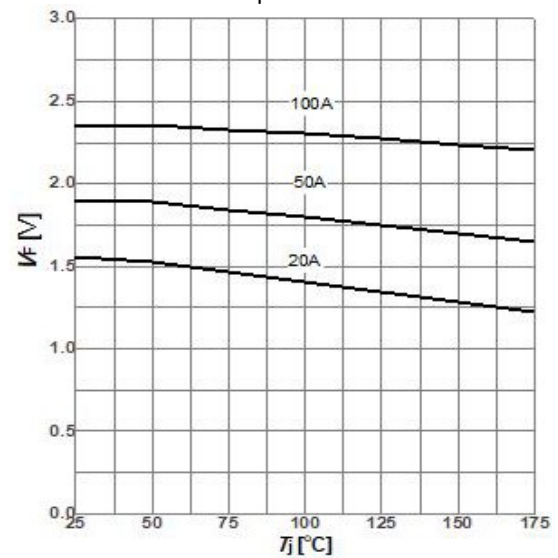


Fig.11 - IGBT transient Thermal Impedance, Junction-Case

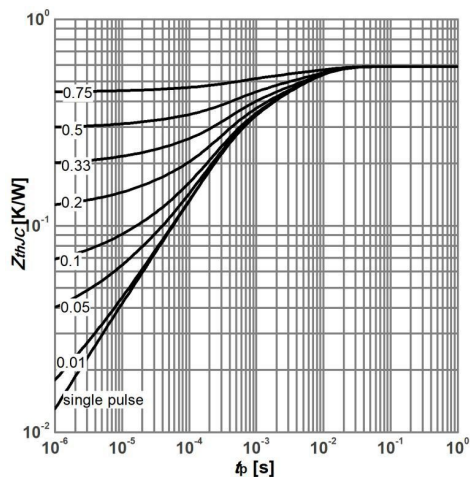
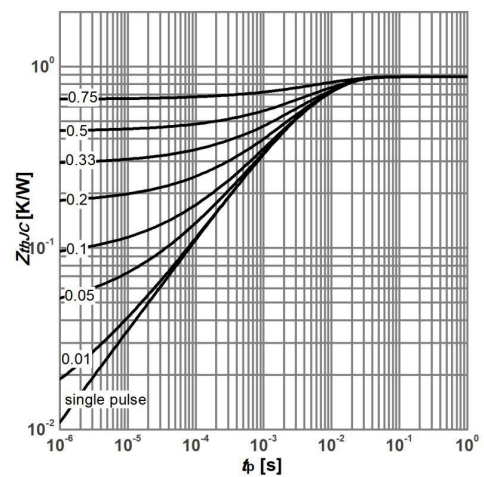


Fig.12 - Diode transient Thermal Impedance, Junction-Case



Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.13 - IGBT Safe operating area

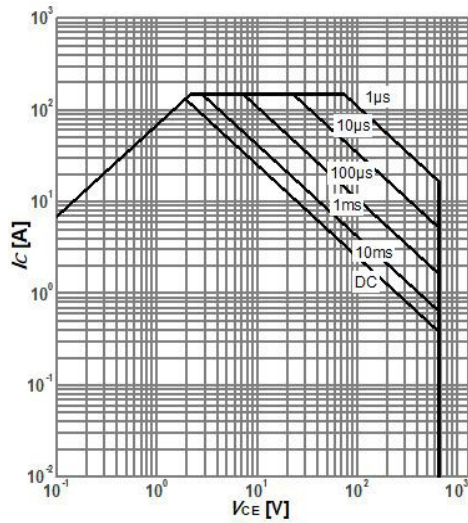
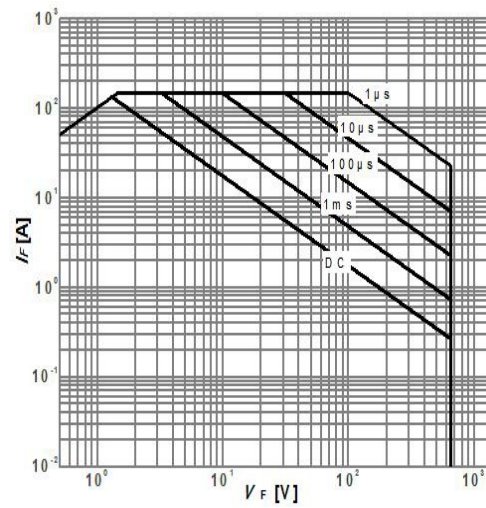
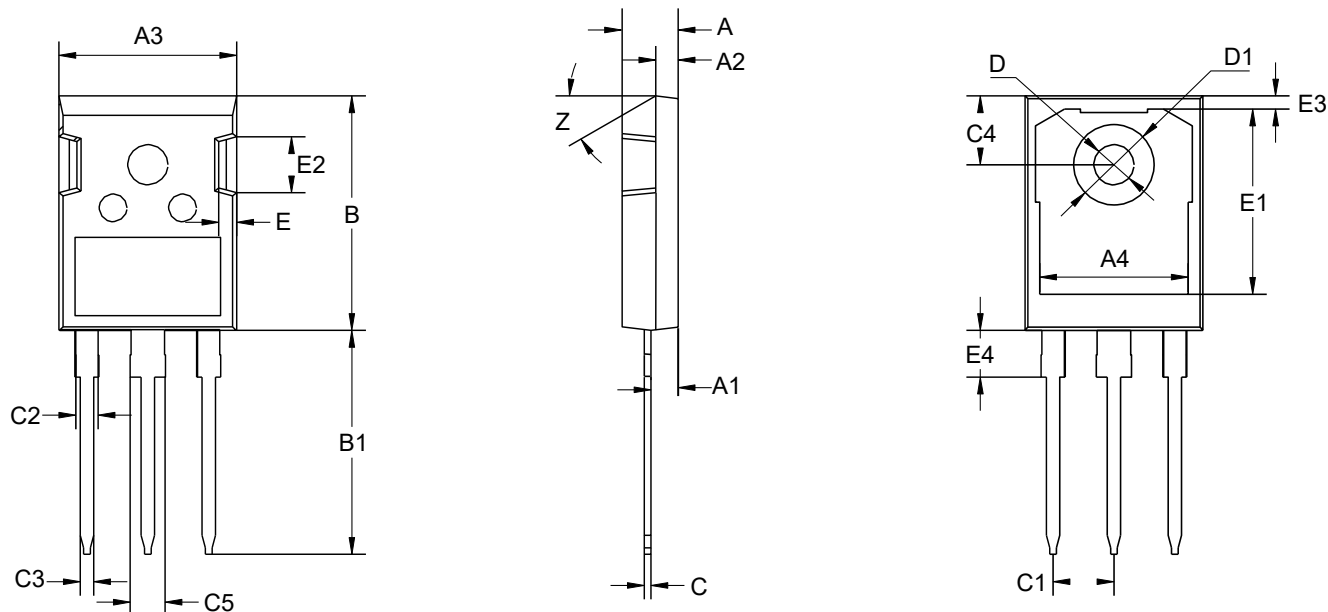


Fig.14 - Diode Safe operating area



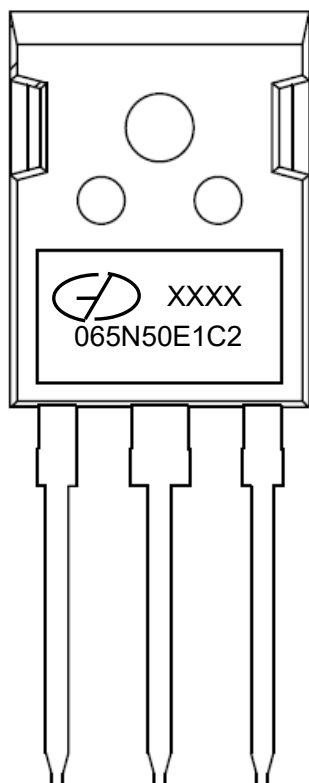
Package Outline Dimensions (Unit: millimeters)

TO-247AD



TO-247AD							
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	4.7	5	5.2	C4	6.04	6.15	6.30
A1	2.3	2.4	2.5	C5	2.8	3	3.2
A2	1.9	2	2.1	D	3.5	3.6	3.7
A3	15.48	15.88	16.28	D1	7	7.19	7.4
A4	13.2	13.5	13.8	E	1.5	1.6	1.7
B	20.8	20.95	21.1	E1	16.25	16.55	16.85
B1	19.8	20	20.32	E2	4.9	5.0	5.1
C	0.5	0.6	0.7	E3	0.95	1.17	1.35
C1	5.34	5.44	5.54	E4	-	4.17	4.5
C2	1.8	2	2.2	Z	-	30°	-
C3	1.1	1.2	1.3		-	-	-

Marking Outline



Part Name: GIT065N50E1C2

1. Logo Mark: 
2. P/N Mark: 065N50E1C2
3. Date Code: XXXX

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