Fast Rectifier Diode

Primary characteristics		
Parameter	**Value**	**Unit**
Collector Emitter Voltage V_{CES}	650	V
DC Collector Current	50	A

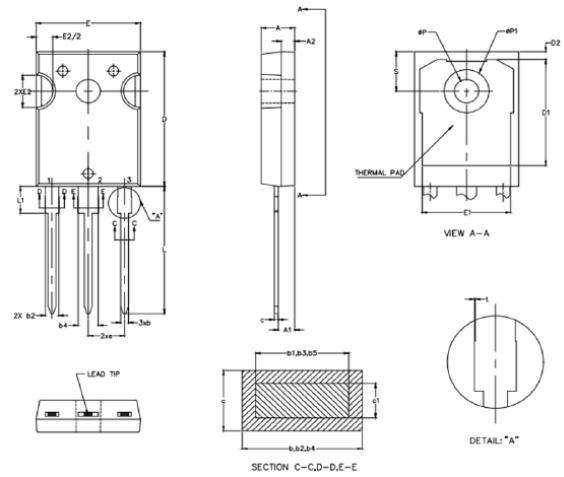
Features

- **TO-247** case for easy automatic insertion.
- Pb-free and **RoHS** compliant
- 650V IGBT chip in trench FS-technology
- Low switching losses
- VCE(sat) with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery

Applications

- High frequency switching application
- Medical applications
- Motion/servo control
- UPS systems

Case dimensions



TO-247

SYM.	A	A1	A2	b	b1	b2	b3	b4	b5	c	c1	D
mm	4.90 5.10	2.31 2.51	1.90 2.10	1.16 1.26	1.15 1.22	1.96 2.06	1.95 2.02	2.96 3.06	2.95 3.02	0.59 0.66	0.58 0.62	20.9 21.1
SYM.	D1	D2	E	E1	E2	e	L	L1	ØP	ØP1	S	t
mm	16.25 16.85	1.05 1.35	15.75 15.90	13.26 -	4.90 5.10	5.44 BSC	19.80 20.10	- 4.30	3.50 3.70	- 7.40	6.05 6.25	0.00 0.15

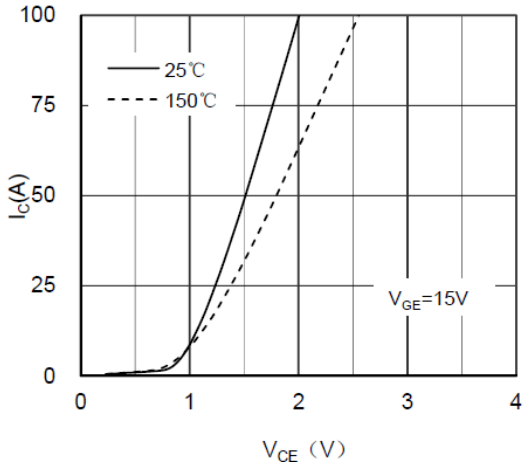
Maximum ratings (T_c = 25°C)			
Parameter	**Symbol**	**Value**	**Unit**
Collector Emitter Voltage	V_{CES}	650	V
Gate Emitter Voltage	V_{GES}	±25*	
Transient Gate Emitter Voltage（tp≤10μs,D<0.01）		±30	
DC Collector Current	I_C	80 @ T_C=25°C 50 @ T_C=100°C	A
Pulsed collector current,tp limited by T_{Jmax}	I_{Cpuls}	150	
Power Dissipation Per IGBT	P_{tot}	357	W
Repetitive Reverse Voltage	V_{RRM}	650	V
Average Forward Current	$I_{F(AV)}$	50	A
Diode pulsed current,tp limited by T_{Jmax}	I_{Fpuls}	150	A
Max. Junction Temperature	T_{Jmax}	175	°C
Operating Temperature	T_{Jop}	-40~175	°C
Storage Temperature	T_{stg}	-55~150	°C
to heatsink	Torque	1.1	Nm
Weight		8	g

* not exceed 20V in application

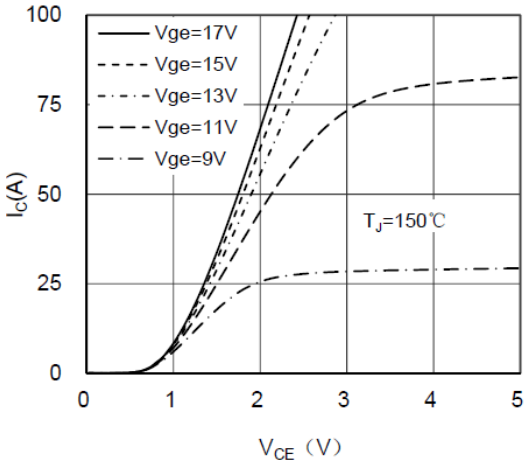
IGBT Electrical characteristics (T_c = 25°C)							
Parameter	**Test condition**		**Symbol**	**Value**			**Unit**
				Min.	**Typ.**	**Max.**	
Gate Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=2.0mA		$V_{GE(th)}$	5.0	6.0	7.0	V
Collector Emitter Saturation Voltage	I_C=50A, V_{GE}=15V, T_J=25°C		$V_{CE(sat)}$	-	1.5	1.85	
	I_C=50A, V_{GE}=15V, T_J=125°C			-	1.7	-	
	I_C=50A, V_{GE}=15V, T_J=150°C			-	1.8	-	
Collector Leakage Current	V_{CE}=650V, V_{GE}=0V, T_J=25°C		I_{CES}	-	-	100	μA
	V_{CE}=650V, V_{GE}=0V, T_J=150°C			-	-	10	mA
Gate Leakage Current	V_{CE}=0V, V_{GE}=±20V, TJ=25°C		I_{GES}	-200	-	200	nA
Gate Charge	V_{CE}=400V, IC=50A,V_{GE}=15V		Q_G	-	280	-	nC
Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		C_{ies}	-	5.3	-	nf
Reverse Transfer Capacitance			C_{res}	-	140	-	pF
Turn on Delay Time	V_{CC}=400V I_C=50A R_G=7.5Ω V_{GE}=±15V, Inductive Load	T_J=25°C	$t_{d(on)}$	-	30	-	ns
		T_J=125°C		-	35	-	ns
		T_J=150°C		-	35	-	ns
Rise Time		T_J=25°C	t_r	-	25	-	ns
		T_J=125°C		-	28	-	ns
		T_J=150°C		-	28	-	ns
Turn off Delay Time	V_{CC}=400V I_C=50A R_G=7.5Ω V_{GE}=±15V, Inductive Load	T_J=25°C	$t_{d(off)}$	-	210	-	ns
		T_J=125°C		-	230	-	ns
		T_J=150°C		-	240	-	ns
Fall Time		T_J=25°C	t_f	-	150	-	ns
		T_J=125°C		-	210	-	ns
		T_J=150°C		-	220	-	ns
Turn on Energy	V_{CC}=400V I_C=50A R_G=7.5Ω V_{GE}=±15V, Inductive Load	T_J=125°C	E_{on}	-	1.55	-	mJ
		T_J=150°C		-	1.6	-	mJ
Turn off Energy		T_J=125°C	E_{off}	-	1.85	-	mJ
		T_J=150°C		-	1.9	-	mJ
Junction to Case Thermal Resistance	-		-	-	-	0.42	K/W

Anti-Parallel Diode Electrical characteristics (T_c = 25°C)						
Parameter	**Test Conditions**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Forward Voltage	I_F=50A , V_{GE}=0V, T_J=25°C	V_F	-	1.85	2.35	V
	I_F=50A , V_{GE}=0V, T_J=125°C		-	1.65	-	
	I_F=50A , V_{GE}=0V, T_J=150°C		-	1.55	-	
Reverse Recovery Time	I_F=50A V_R=400V dI_F/dt=-2000A/µs T_J=150°C	t_r		120		ns
Max. Reverse Recovery Current		I_{RRM}		50		A
Reverse Recovery Charge		Q_{RR}		3.3		µC
Reverse Recovery Energy		E_{rec}		1		mJ
Junction to Case Thermal Resistance		R_{thJCD}			0.75	K/W

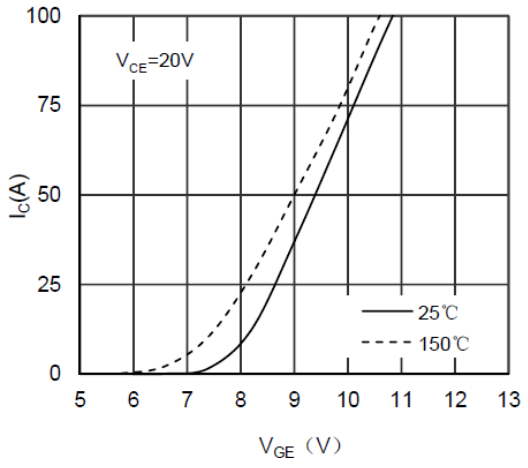
Typical Output Characteristics IGBT



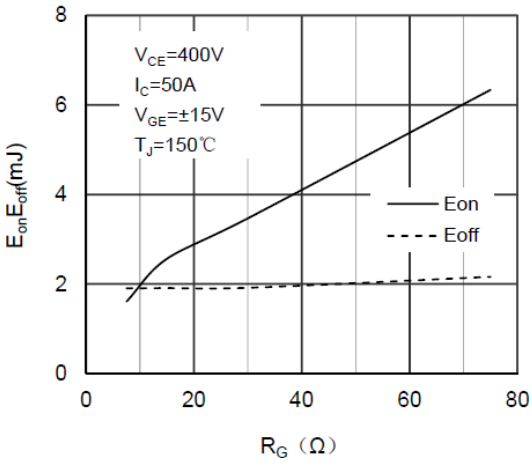
Typical Output Characteristics IGBT

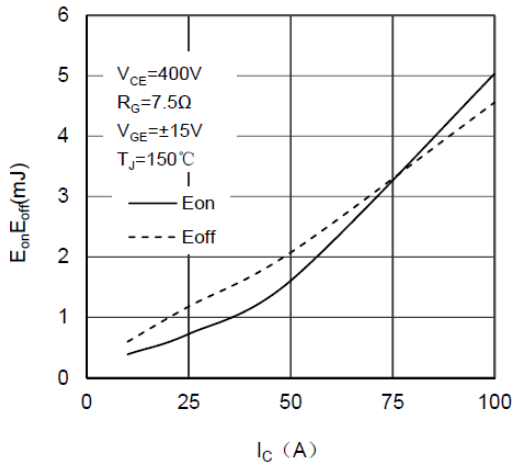
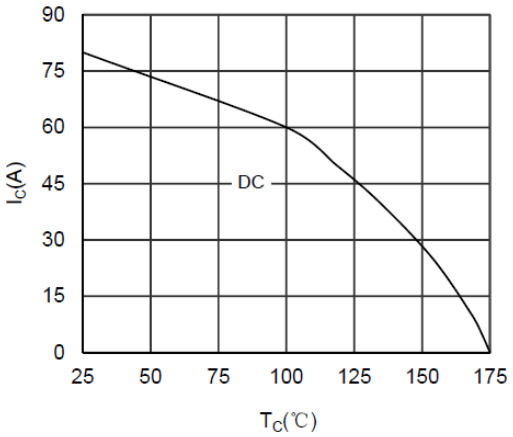
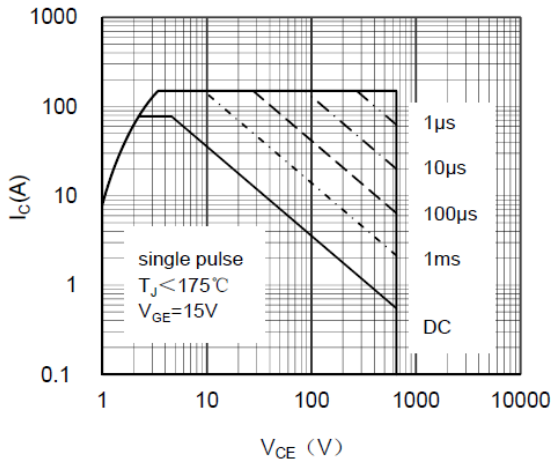
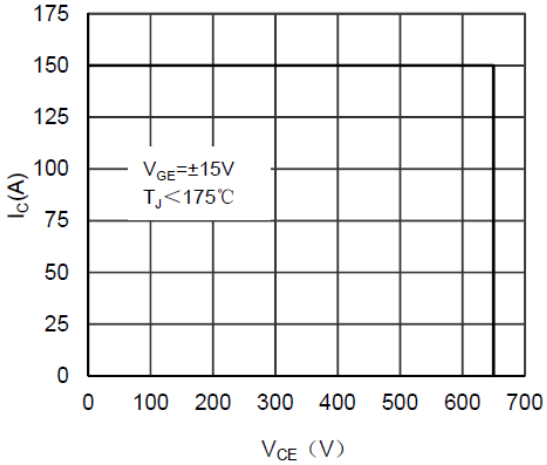


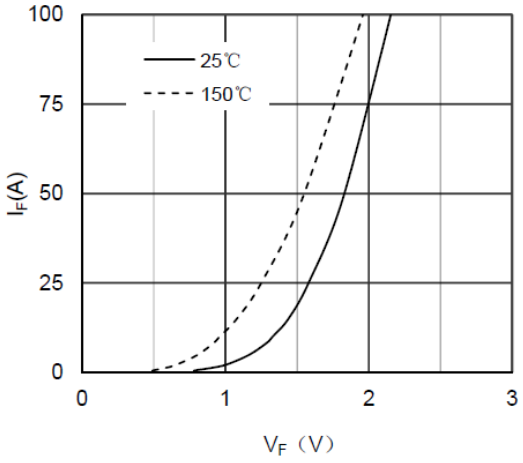
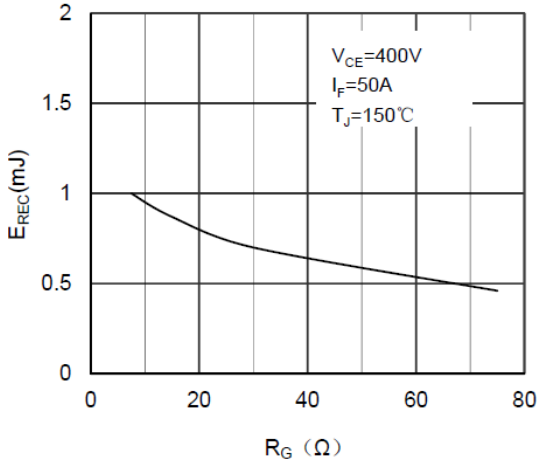
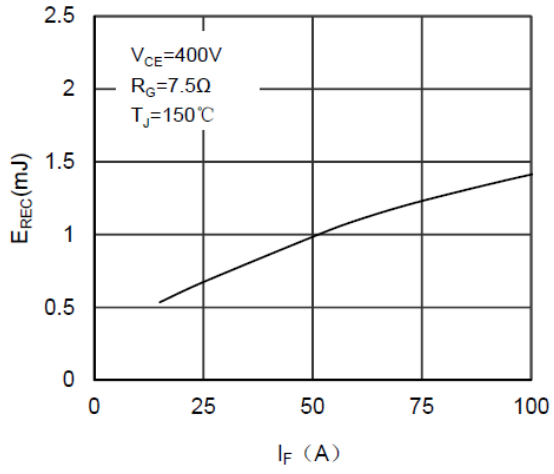
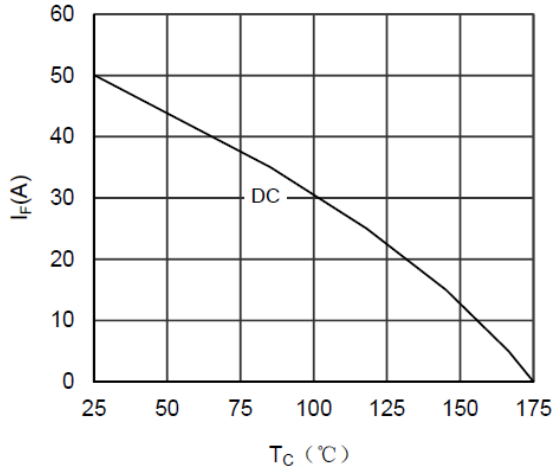
Typical Transfer characteristics IGBT



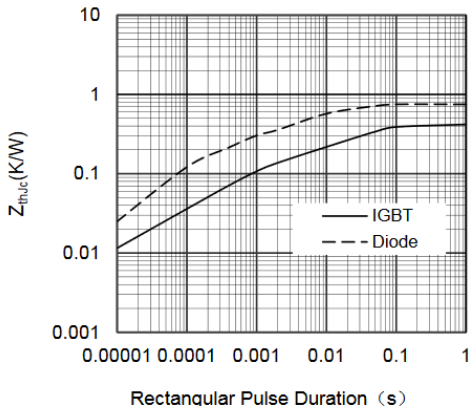
Switching Energy vs Gate Resistor IGBT



Switching Energy vs Collector Current IGBT	Collector Current vs Case temperature IGBT
	
Forward Biased Safe Operating Area	**Reverse Biased Safe Operating Area IGBT**
	

Diode Forward Characteristics Diode	Switching Energy vs Gate Resistor Diode
	
Switching Energy vs Forward Current Diode	**Forward current vs Case temperature Diode**
	

Transient Thermal Impedance of Diode and IGBT



Ordering information			
Part Number	**Package**	**Shipping Quantity**	**Dimensions**
AKS50GBU65B	TO-247	---	---

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