

SPT+ Type 1700V IGBT Module

Description

The IGBT Module 7AKM-1 package devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems.

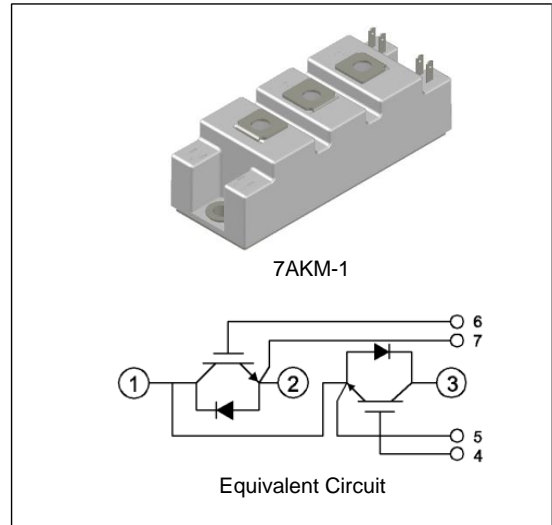
These IGBT Module series are ideally suited for IH ,High Power inverters, Motors drives and other applications where switching losses are significant portion of the total losses.

Features

- $BV_{CES}=1700V$
- Low Conduction Loss: $V_{CE(sat)} = 2.4V @ I_C=100A$
- Fast & Soft Anti-Parallel FWD
- Short Circuit rated:10us at $T_C=100^\circ C$
- Low inductance module structure

Applications

- Inverter for motor drive, AC and DC servo drive amplifier
- Soft Switching Welding Machine, UPS



Absolute Maximum Ratings (@ $T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector to Emitter Voltage		1700	V
V_{GES}	Gate to Emitter Voltage		± 20	V
I_C	Collector Current	$T_C=25^\circ C$	150	A
		$T_C=100^\circ C$	100	A
I_{CM}	Pulsed Collector Current , $t_p=1ms$		200	A
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	100	A
I_{FM}	Diode Maximum Forward Current		200	A
P_D	Maximum Power Dissipation		690	W
T_J	Operating Junction Temperature Range		-40~+150	$^\circ C$
T_{STG}	Storage Temperature Range		-40~+125	$^\circ C$
V_{iso}	Isolation Voltage	AC 1minute	2500	V
	Mounting screw Torque: M5		4	N.M
	Weight		155	g

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$ (Per IGBT)	Thermal Resistance, Junction to case for IGBT	0.218	$^\circ C/W$
$R_{th(J-C)}$ (Per Diode)	Thermal Resistance, Junction to case for Diode	0.36	$^\circ C/W$
$R_{th(C-S)}$ (Per Package)	Thermal Resistance, Case to Sink	0.05	$^\circ C/W$

Electrical Characteristics of IGBT (@ $T_C=25\text{ }^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE}=0V, I_C=1mA$	1700	-	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=100A, V_{GE}=15V$	-	2.4	-	V
		$I_C=100A, V_{GE}=15V, T_{vj}=125^\circ\text{C}$	-	2.8	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=4mA$	5.0	6.2	7.0	V
I_{CES}	Zero Gate Voltage Collector Current	$V_{CE}=V_{CES}, V_{GE}=0V$	-	-	1	mA
I_{GES}	Gate to Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V$	-	-	± 400	nA

Switching Characteristics (@ $T_C=25\text{ }^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_C=100A, V_{CC}=900V, V_{GE}=\pm 15V, R_G=4.1\Omega, \text{Inductive Load}$	-	200	-	ns
t_r	Rise Time		-	70	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	240	-	ns
t_f	Fall Time		-	440	-	ns
E_{on}	Turn-on Switching Loss		-	23.0	-	mJ
E_{off}	Turn-off Switching Loss		-	15.0	-	mJ
E_{ts}	Total Switching Loss		-	38.0	-	mJ
$t_{d(on)}$	Turn-on Delay Time	$I_C=100A, V_{CC}=900V, V_{GE}=\pm 15V, R_G=4.1\Omega, \text{Inductive Load}, T_{vj}=125^\circ\text{C}$	-	220	-	ns
t_r	Rise Time		-	80	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	260	-	ns
t_f	Fall Time		-	700	-	ns
E_{on}	Turn-on Switching Loss		-	33.0	-	mJ
E_{off}	Turn-off Switching Loss		-	24.0	-	mJ
E_{ts}	Total Switching Loss		-	57.0	-	mJ
C_{res}	Input Capacitance	$V_{GE}=0V, V_{CE}=25V, f=1.0MHz$	-	6.89	-	nF
C_{res}	Reverse Transfer Capacitance		-	0.23	-	nF
C_{oes}	Output Capacitance		-	0.45	-	nF
Q_g	Total Gate Charge		-	0.77	-	nC
R_{gint}	Internal Gate Resistance		-	4	-	Ω
t_{sc}	Short Circuit Withstand Time	$V_{CC}=900V, V_{GE}=\pm 15V$	10	-	-	us
I_{SC}	Short Circuit Current	$T_P \leq 10us @ T_{vj}=150^\circ\text{C}$		330		A

Electrical Characteristics of Diode (@ $T_c=25\text{ }^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=100\text{A}$	-	1.8	2.1	V
		$I_F=100\text{A}, T_{vj}=125\text{ }^\circ\text{C}$	-	1.95	-	V
Q_{rr}	Diode Reverse Recovery Charge	$I_F=100\text{A},$ $V_R=900\text{V},$ $di/dt=-1400\text{A/us}$	-	24.0	-	nC
I_{rr}	Diode Peak Reverse Recovery Current		-	95	-	A
E_{rec}	Reverse Recovery Energy		-	13.8	-	mJ
Q_{rr}	Diode Reverse Recovery Charge	$I_F=100\text{A},$ $V_R=900\text{V},$ $di/dt=-1400\text{A/us}$ $T_{vj}=125\text{ }^\circ\text{C}$	-	36.5	-	nC
I_{rr}	Diode Peak Reverse Recovery Current		-	100	-	A
E_{rec}	Reverse Recovery Energy		-	21.0	-	mJ

Typical Performance Characteristics

Fig. 1. Typical IGBT Output Characteristics

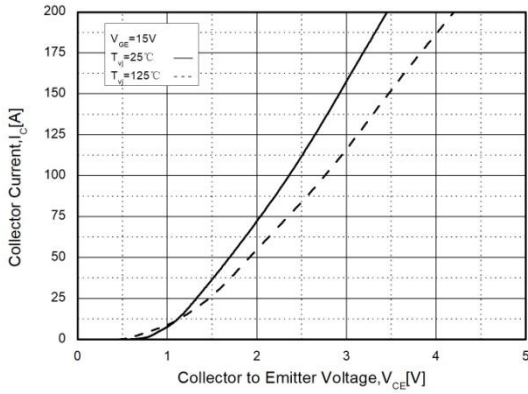


Fig. 2. IGBT Transfer Characteristics

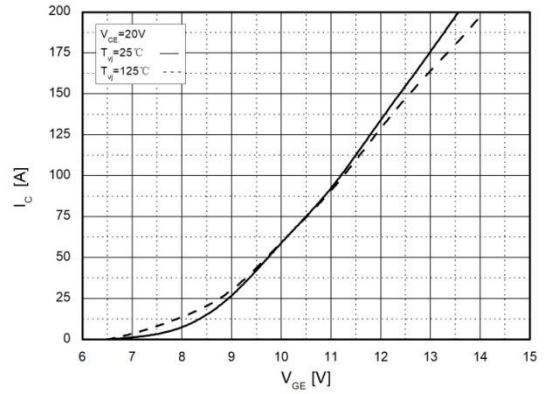


Fig. 3. IGBT Switching Loss vs. R_G

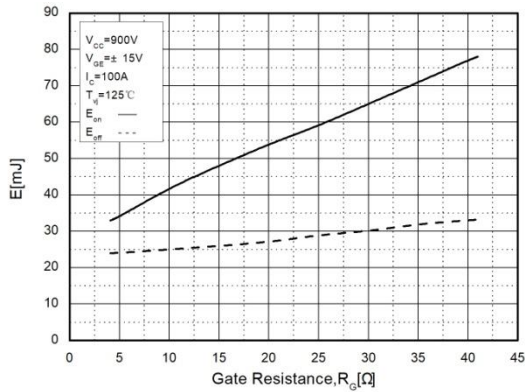


Fig. 4. IGBT Switching Loss vs. I_C

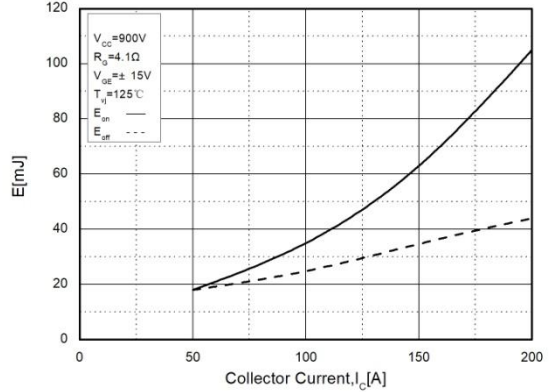


Fig. 5. Diode Switching Loss vs. R_G

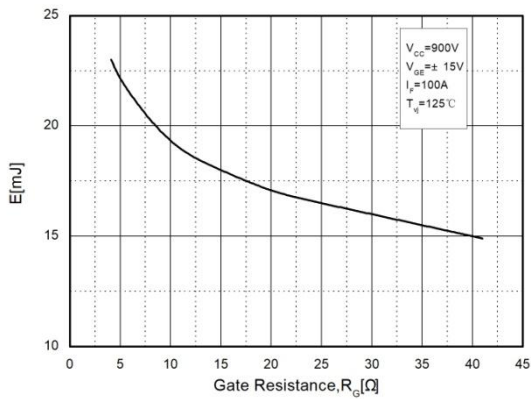
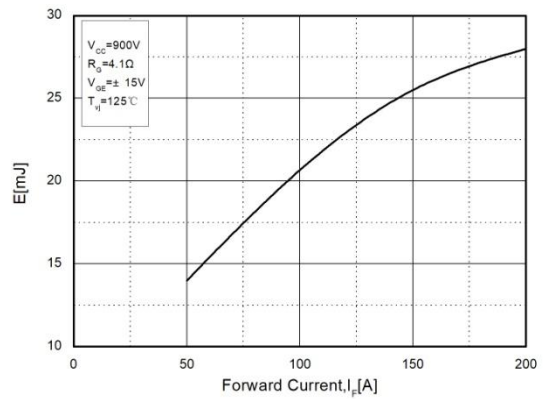


Fig. 6. Diode Switching Loss vs. I_F



Typical Performance Characteristics

Fig. 7. Reverse Biased Safe Operating Area

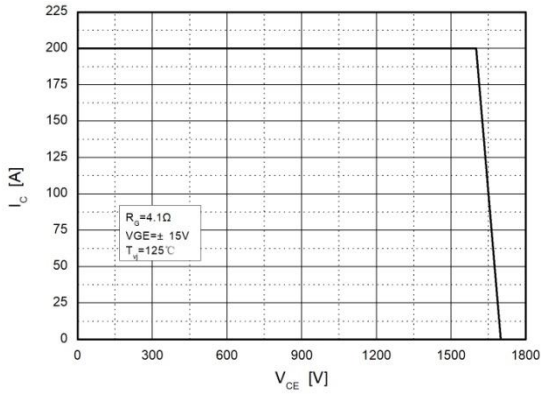


Fig. 8. Power Dissipation vs. T_C

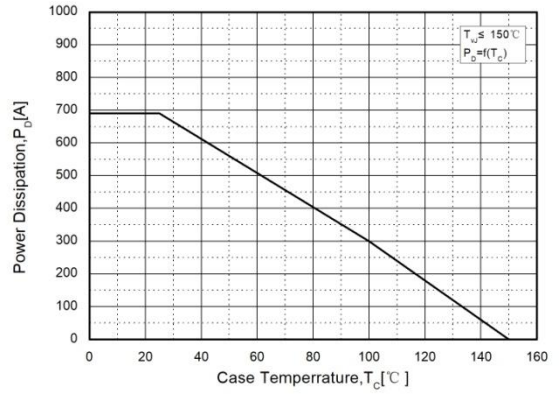


Fig. 9. Transient Thermal Impedance

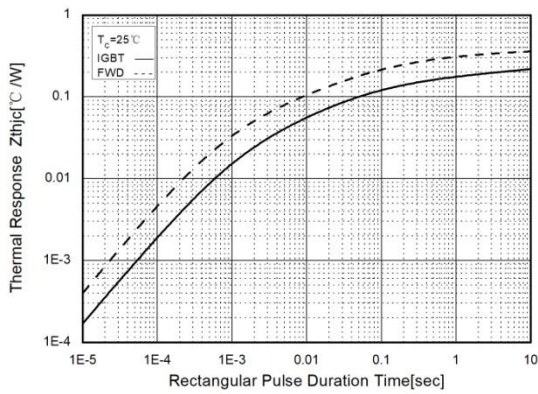
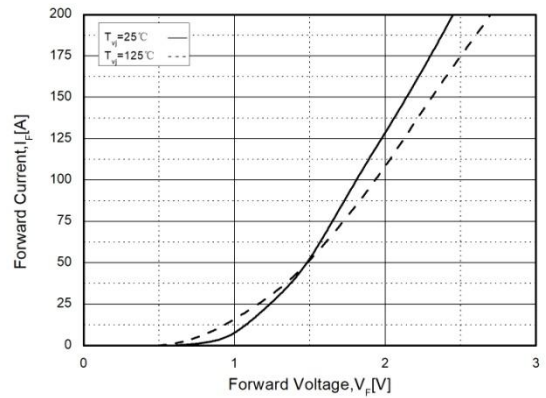
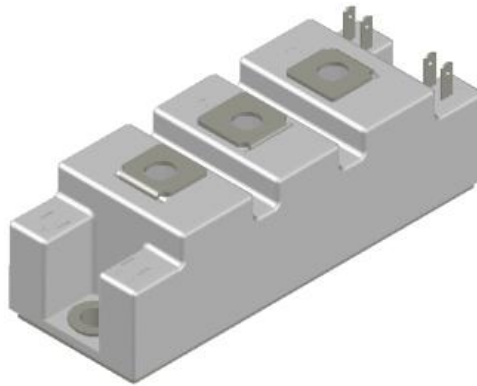


Fig. 10. Forward Characteristics



Package Dimensions

7AKM-1



(Dimensions in Millimeters)

