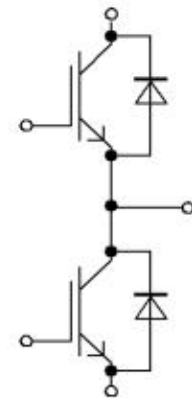
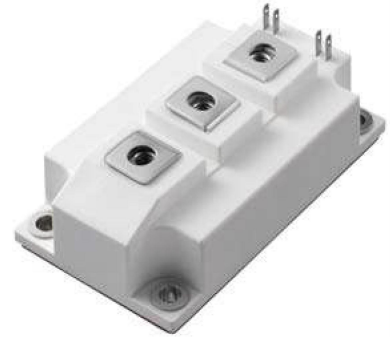


# ESK150SH120AN

## 1200V 150A 2-Pack IGBT Module

### Feature

- Planar IGBT technology
  - Low saturation voltage
  - 10us Short Circuit current
  - Low turn-off losses
  - Positive temperature coefficient
- Free wheeling diodes with fast and soft reverse recovery
- Industrial standard package with copper base plate



### Applications

- Welders / Power supply
- UPS / Inverter
- Industrial motor driver

### Absolute Maximum Ratings @T<sub>c</sub> = 25°C

Symbol	Parameter	Conditions	Ratings	Unit
<b>IGBT Inverter</b>				
V <sub>CES</sub>	Collector-emitter voltage		1200	V
I <sub>C</sub>	Continuous collector current	T <sub>c</sub> =25°C, T <sub>vj(max)</sub> =175°C	200	A
		T <sub>c</sub> =85°C, T <sub>vj(max)</sub> =175°C	150	
I <sub>CM</sub>	Repetitive peak collector current <sup>1</sup>	T <sub>c</sub> =80°C, t <sub>p</sub> =1ms	300	A
t <sub>SC</sub>	Short circuit data <sup>2</sup>	V <sub>GE</sub> =15V, V <sub>CC</sub> =800V, V <sub>CE</sub> <V <sub>CES</sub> , T <sub>vj</sub> =125°C	10	us
V <sub>GES</sub>	Gate-emitter voltage		±20	V
P <sub>tot</sub>	Total power dissipation	T <sub>c</sub> =25°C, T <sub>vj(max)</sub> =175°C	1250	W
		T <sub>c</sub> =80°C, T <sub>vj(max)</sub> =175°C	750	
T <sub>vj</sub>	Junction temperature		-40~175	°C
<b>Diode Inverter</b>				
V <sub>RRM</sub>	Repetitive peak reverse voltage		1200	V
I <sub>FRM</sub>	Repetitive peak forward current	t <sub>p</sub> =1ms	300	A
I <sub>F</sub>	Forward current		150	A
T <sub>vj</sub>	Operation junction temperature		-40~150	°C
<b>Module</b>				
T <sub>stg</sub>	Storage temperature		-40~175	°C

$V_{isol}$	Isolation test voltage	AC sinus 50HZ, t=1min	2500	V
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1.Verified by design/characterization

2.Allowed number of short circuits:&lt;1000;time between short circuit:&gt;1S

## Electrical Characteristics @Tc = 25°C(unless otherwise specified)

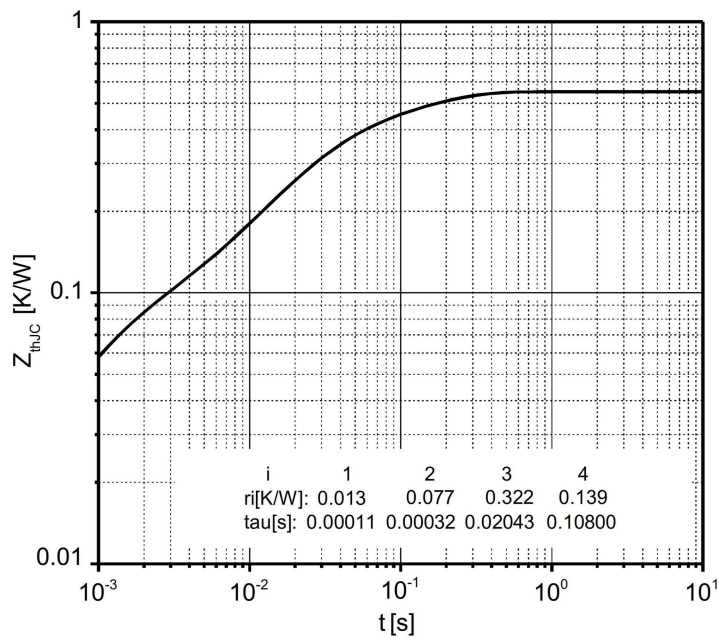
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>IGBT, Inverter</b>							
$V_{CEsat}$	Collector emitter saturation voltage	$V_{GE}=15V, I_C=150A$	$T_{vj}=25^{\circ}C$	2.80	3.20	V	
			$T_{vj}=150^{\circ}C$	-	-		
$V_{GE(th)}$	Gate emitter threshold voltage	$V_{CE}=V_{GE}, I_C=3mA$	4.6	5.8	6.6	V	
$I_{CES}$	Collector emitter cut-off voltage	$V_{CE}=1200V, V_{GE}=0V$			1	mA	
$I_{GES}$	Gate emitter cut-off voltage	$V_{CE}=1200V, V_{GE}=0V$			$\pm 500$	nA	
$C_{ies}$	Input capacitance	$V_{CE}=25V$		12.6		nF	
$C_{oes}$	Output capacitance	$V_{GE}=0V$		1.25		nF	
$C_{res}$	Reverse transfer capacitance	$f=1.0MHz$ $T_j=25^{\circ}C$		0.43		nF	
$Q_g$	Gate charge	$V_{GE}=0\sim+15V$		1500		nC	
$T_{d(on)}$	Turn-on delay time	$I_C=150A$ $V_{GE}=\pm 15V$ $RG(on)=10\Omega$ $RG(off)=5.1\Omega$ $T_{vj}=125^{\circ}C$		130		ns	
$t_r$	Rise time			36		ns	
$T_{d(off)}$	Turn-off delay time			300		ns	
$t_f$	Fall time			120		ns	
$E_{on}$	Turn-on energy			14.9		mJ	
$E_{off}$	Turn-off energy			9.9		mJ	
<b>Diode Inverter</b>							
$V_F$	Forward voltage		$I_F = 200A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	1.7	2.2	V
		$T_{vj}=125^{\circ}C$		1.7			
IRRM	Reverse recovery current	$V_{GE}=\pm 15V$ $I_C=150A$ $RG(on)=10\Omega$ $RG(off)=5.1\Omega$	$T_{vj}=25^{\circ}C$	145		A	
			$T_{vj}=125^{\circ}C$	173			
$E_{rr}$	Reverse recovery energy		$T_{vj}=25^{\circ}C$	7.0		mJ	
			$T_{vj}=125^{\circ}C$	-			
$Q_{rr}$	Recovered charge		$T_{vj}=25^{\circ}C$	12000		nC	
			$T_{vj}=125^{\circ}C$	28800			
$T_{rr}$	Reverse Recovery Time		$T_{vj}=25^{\circ}C$	120		ns	
			$T_{vj}=125^{\circ}C$	-			

## Thermal Characteristics

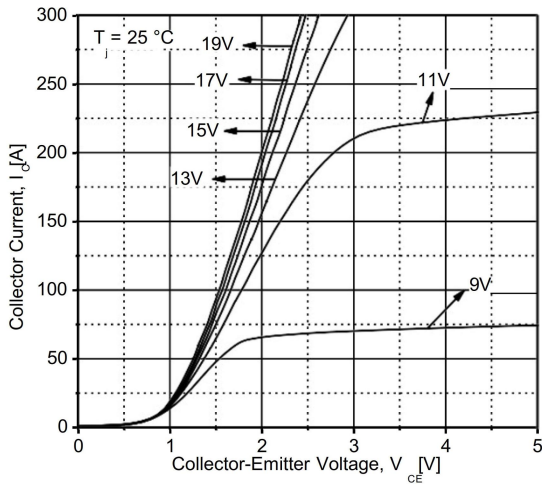
Symbol	Parameter	Conditions	Valu			Unit
			Min	Typ	Max	
$R_{(thj)cI}$	Thermal Resistance junction to case (IGBT)	Per IGBT	-	0.19		$^{\circ}C/W$
$R_{(thj)cD}$	Thermal Resistance junction to case (Diode)	Per Diode	-	0.26		$^{\circ}C/W$
<b>Module</b>						
M	Mounting torque	Fixing screw M6	2.5		6.0	N.m
G	Weight			310		g

## Thermal characteristics(Curves)

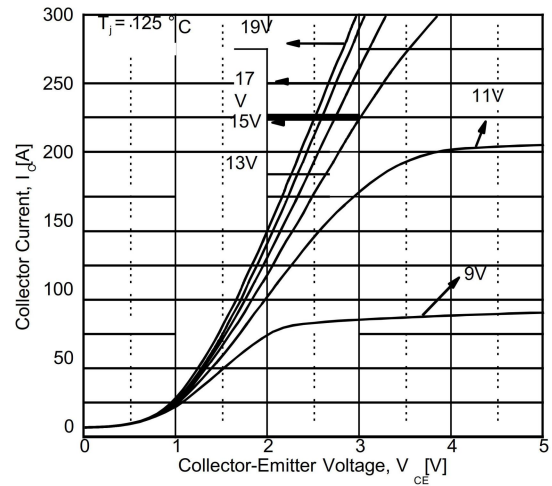
Typical Diode Thermal Impedance



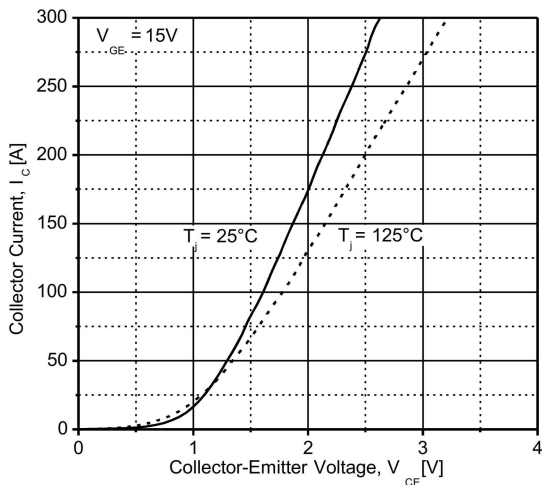
Typical IGBT Output Characteristics



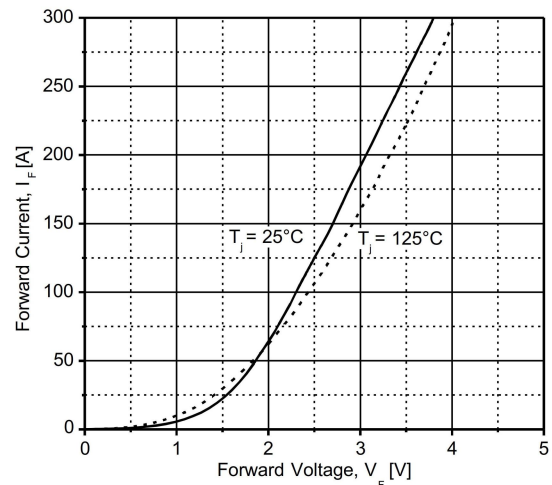
Typical IGBT Output Characteristics



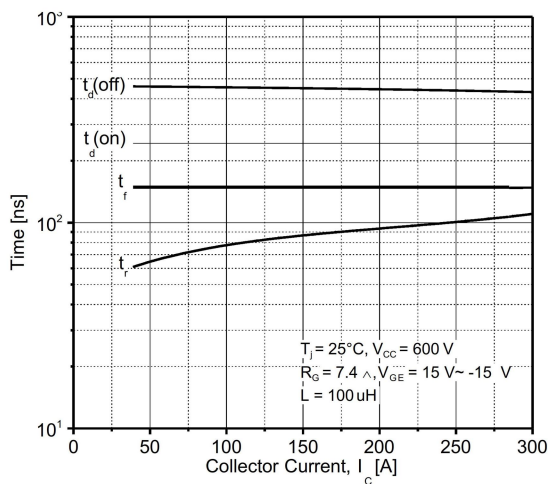
Typical IGBT Output Characteristics



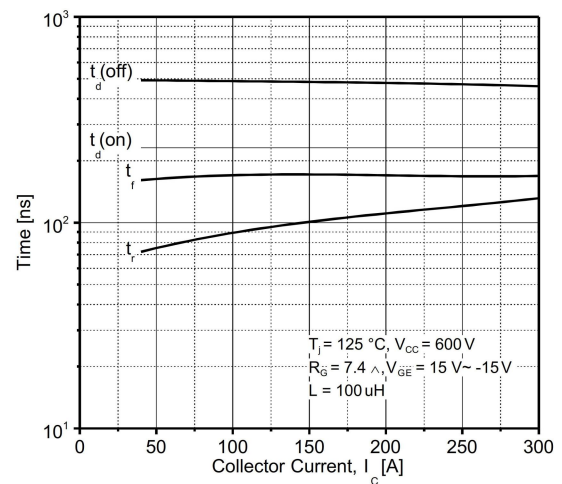
Typical Diode Forward Characteristics



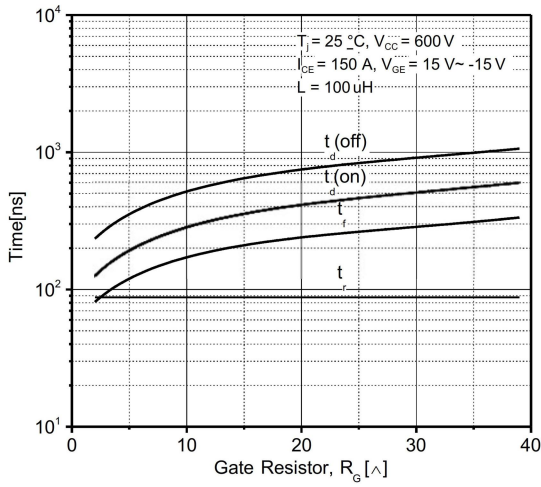
Typical Switching Time vs. Collector Current



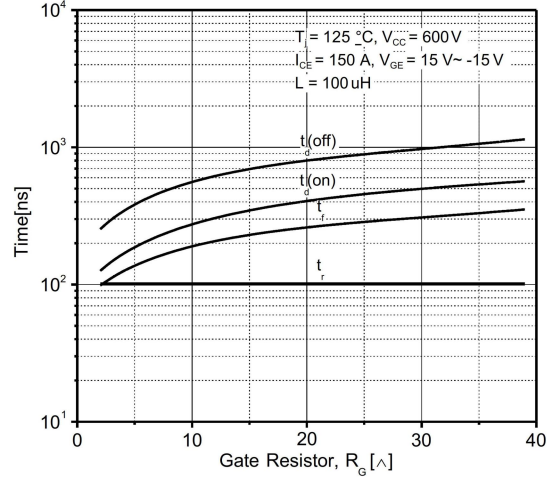
Typical Switching Time vs. Collector Current



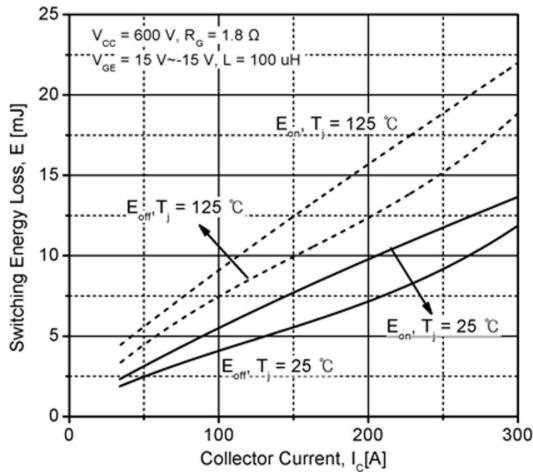
Typical Switching Time vs. Gate Resistor



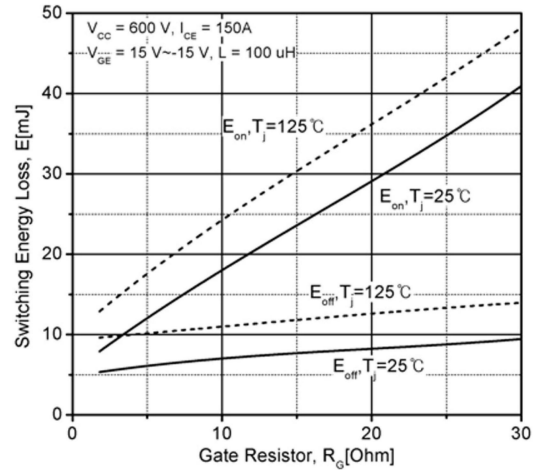
Typical Switching Time vs. Gate Resistor



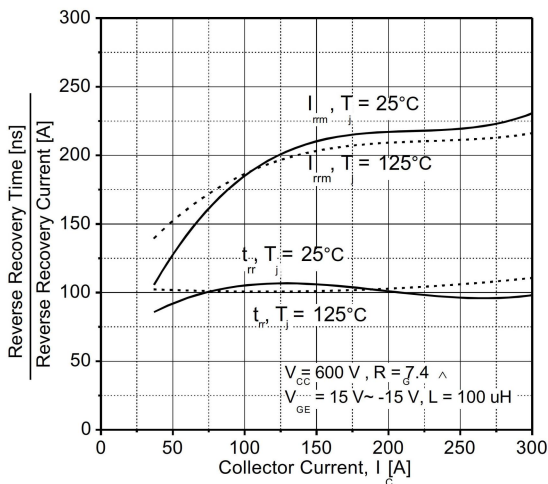
Typical IGBT Switching Loss



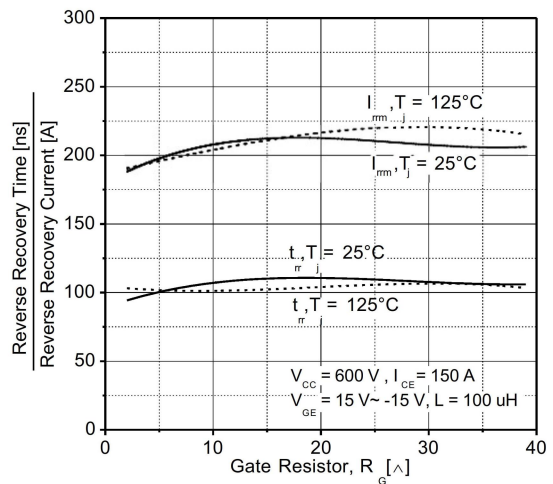
Typical IGBT Switching Loss



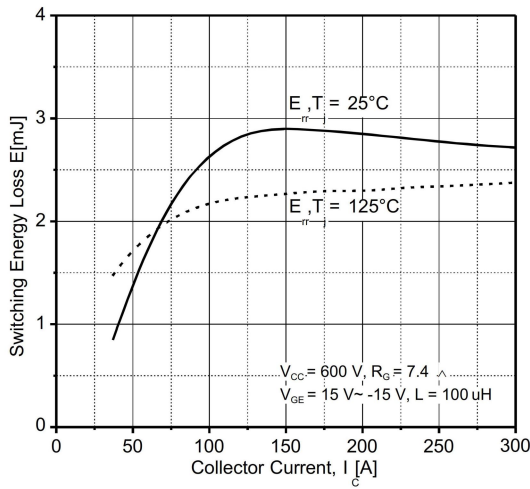
Typical Recovery Characteristics of Diode



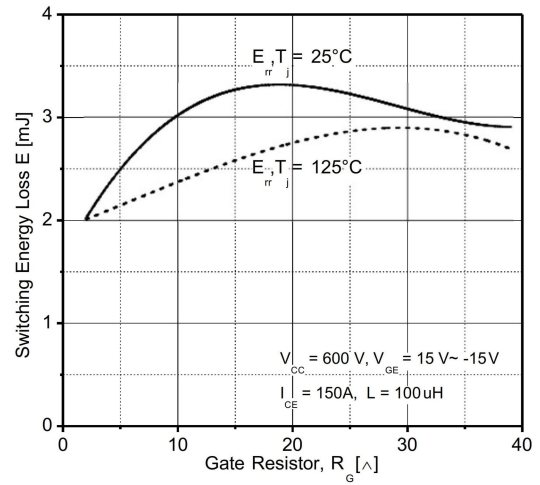
Typical Recovery Characteristics of Diode



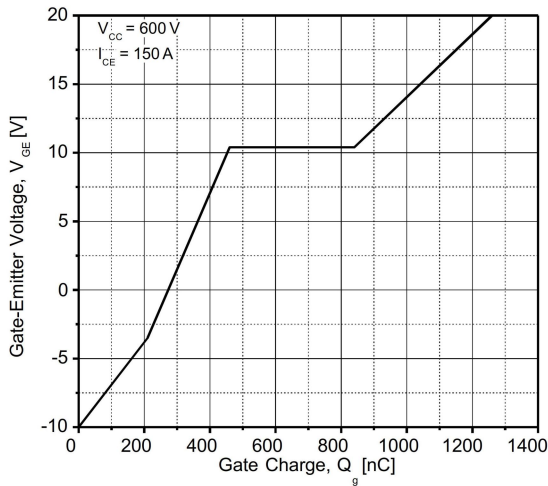
**Typical Diode Switching Loss**



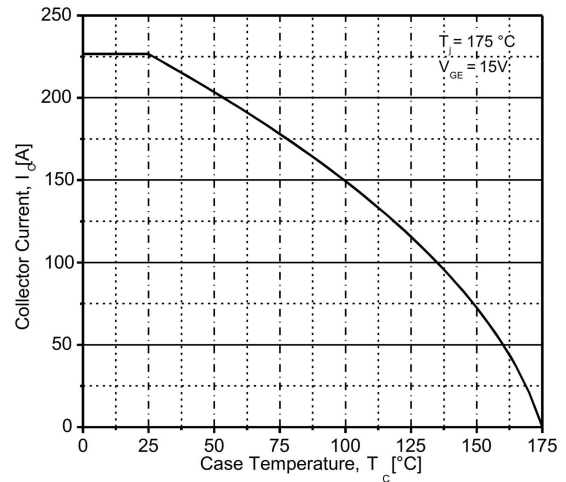
**Typical Diode Switching Loss**



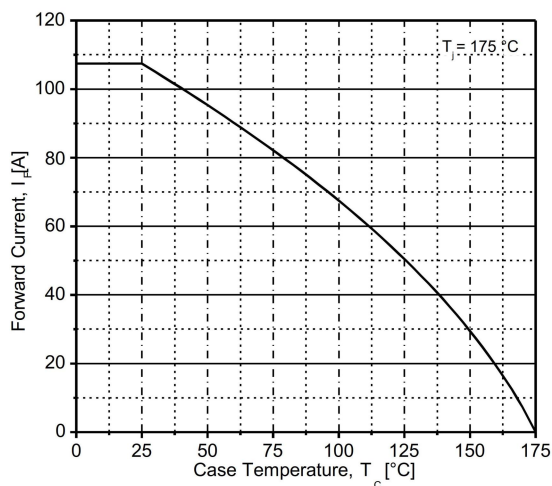
**Typical Gate Charge Characteristics**



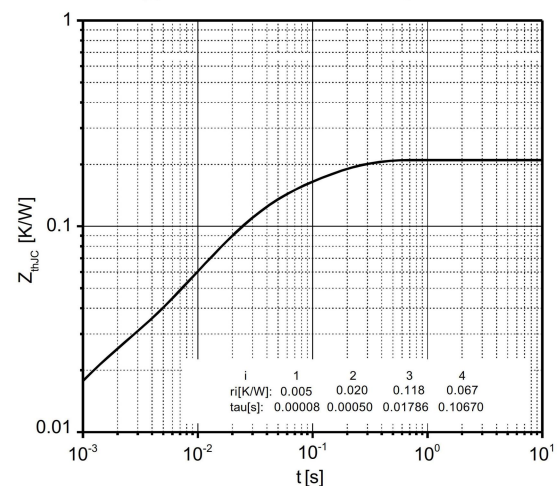
**Case Temperature vs. Collector Current**



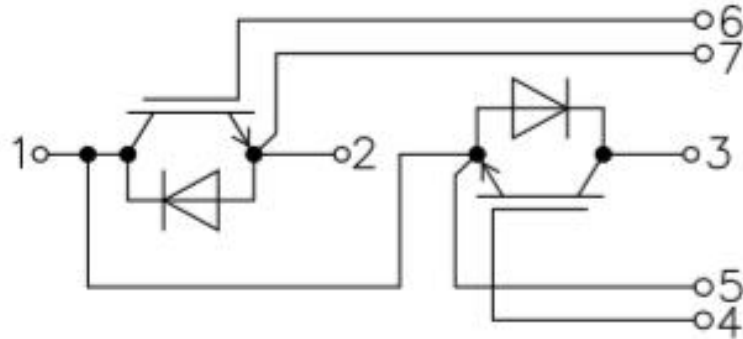
**Case Temperature vs. Diode Current(TBD)**



**Typical IGBT Thermal Impedance**



## Circuit Diagram



## Package Dimension

