D5 module with Trench/Fieldstop IGBT and Emitter Controlled diode

Features

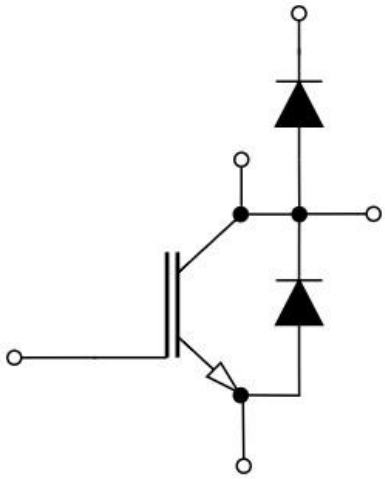
- Low $V_{CE(sat)}$ Trench IGBT technology
- High creepage and clearance distances
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Package with CTI>400

D5

Typical Applications

- 3-level-applications
- Motor Drives
- Chopper application

Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS,f=50 Hz,t=60 s	4.0	kV
Internal isolation		basic insulation(class 1,IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	29.0	mm
Creepage distance	d_{creep}	terminal to terminal	23.0	mm
Clearance	d_{clear}	terminal to heatsink	23.0	mm
Clearance	d_{clear}	terminal to terminal	11.0	mm
Comparative tracking index (electrical)	*CTI*		＞400	

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Stray Inductance	L_{CE}			--	20	--	nH
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$			--	0.70	--	mΩ
Storage temperature	T_{stg}			-40	--	125	°C
Mounting torque for module mounting	M	-Mounting according to valid application note	M6, Screw	3.00	--	6.00	Nm
Terminal connection torque	M	-Mounting according to valid application note	M6, Screw	2.5	--	5.0	Nm
Weight	G			--	340	--	g

IGBT , Brake-Chopper

Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	±30	V
I_{CDC}	Continuous Collector Current @ Tc = 80°C ($T_{vj\,max}$ = 175°C)	300	A
I_{CM}	Pulsed Collector Current，t_p =1 ms	600	A
T_{Vjmax}	Maximum Junction Temperature	175	℃

Characteristics （T_c=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C =300A,V_{GE} = 15V	T_{vj} = 25 °C	--	1.75	2.20	V
			T_{vj} = 150 °C	--	2.20	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	I_C=12mA,V_{CE}=V_{GE}		4.80	5.40	6.50	V
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 1700V		--	--	100	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±30 V, V_{CE} = 0 V, T_{vj} = 25°C		--	--	100	nA
R_{Gint}	Internal Gate Resistance	f=1MHz		--	4.37	--	Ω
C_{ies}	Input Capacitance	V_{CE}=25V,V_{GE}=0V, f=1MHz		--	12.5	--	nF
C_{res}	Reverse Transfer			--	0.21	--	nF
Q_G	Gate Charge	V_{CC} = 900 V, V_{GE} =15 V		--	1.05	--	μC
$t_{d(on)}$	Turn−On Delay Time	V_{CE} = 900 V, I_C =300 A, R_{Gon} = 10Ω,R_{Goff} = 15Ω V_{GE} =±15V Inductive Load T_{vj} = 25°C		--	0.40	--	μs
t_r	Rise Time			--	0.13	--	
$t_{d(off)}$	Turn−off Delay Time			--	1.36	--	
t_f	Fall Time			--	0.25	--	
E_{on}	Turn−On Switching Loss per Pulse			--	141.5	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	83.8	--	
$t_{d(on)}$	Turn−On Delay Time	V_{CE} = 900 V, I_C =300 A, R_{Gon} = 10Ω,R_{Goff} = 15Ω V_{GE} =±15V Inductive Load T_{vj} = 150°C		--	0.39	--	μs
t_r	Rise Time			--	0.17	--	
$t_{d(off)}$	Turn−off Delay Time			--	1.53	--	
t_f	Fall Time			--	0.45	--	
E_{on}	Turn−on Switching Loss per Pulse			--	194.4	--	mJ
E_{off}	Turn Off Switching Loss per Pulse			--	114.5	--	
$I_{c(sc)}$	SC Data	t_P≤10 μs,V_{GE} ≤15 V, T_{vj} ≤150 ℃,V_{CC}=1000 V, V_{CEmax}=V_{CES} -L_{SCE}·di/dt		--	1259	--	A
R_{thJC}	Thermal resistance	Junction-to-Case (per IGBT)			0.120		K/W
$T_{vj\,op}$	Temperature under switching conditions			-40		175[1)]	℃

[1)] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode , Brake-Chopper

Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1700	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current, t_p=1ms	600	A

Characteristics （T_c = 25°C unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 300 A, T_{vj}=25°C	--	1.60	2.10	V
		I_F=300 A, T_{vj}=150°C	--	1.75	--	
T_{rr}	Reverse Recovery Time	V_{CE}=900 V,V_{GE}=−15 V, I_F=300 A T_{vj} = 25°C	--	0.85	--	μs
I_{RM}	Peak Reverse Recovery Current		--	234	--	A
Q_{rr}	Recovered Charge		--	71	--	μC
E_{rec}	Reverse Recovery Energy		--	29.2	--	mJ
T_{rr}	Reverse Recovery Time	V_{CE}=900 V, V_{GE}= −15 V I_F=300 A T_{vj} = 150°C	--	1.39	--	ns
I_{RM}	Peak Reverse Recovery Current		--	221	--	A
Q_{rr}	Recovered Charge		--	117	--	μC
E_{rec}	Reverse Recovery Energy		--	54.3	--	mJ
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)		0.180		K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		175[2)]	℃

[2)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode , Reverse

Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

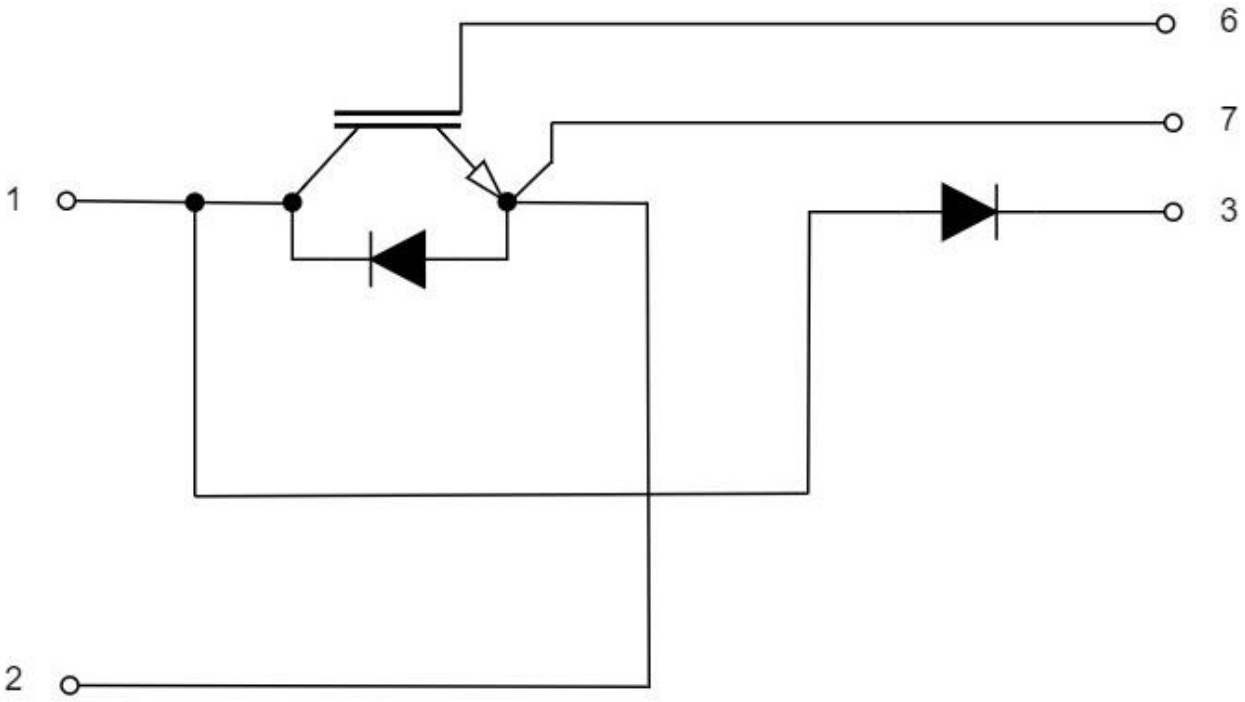
Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1700	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	600	A

Characteristics （Tc=25℃ unless otherwise noted）

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V_F	Diode Forward Voltage	I_F = 300 A, T_{vj} = 25°C	--	1.60	2.10	V
		I_F = 300 A, T_{vj} = 175°C	--	1.75	--	
R_{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.180		K/W
$T_{vj\ op}$	Temperature under switching conditions		-40		175[3)]	℃

[3)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

CIRCUIT DIAGRAM



PACKAGE DIMENSION