SCE400N1200EK6B

1200V, 400A, 4mΩ, Six-pack (Three-phase), Silicon Carbide MOSFET Module

Product Data Sheet

General Description

The SCE-MEK6 module incorporates SCE's 1200V Gen3 N-channel SiC MOSFET. NTC temperature sensor inside

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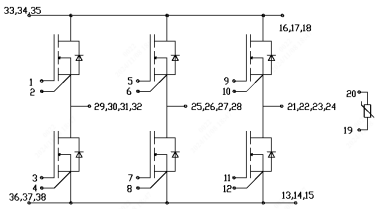


Features

- High Current Density
- Low Inductive Design
- Low Switching Losses
- High-frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation

Applications

- High Frequency Switching Application
- DC/DC Converter
- DC Charger for EV
- Welding

Ordering Informations

Order Number / Marking	SCE400N1200EK6B
Package Type	EK6

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V_{DS}	Drain-source Voltage		1200		V	T_C=25°C
I_{DC}	Continuous DC Drain Current		400		A	T_C=25°C
T_{op}; T_{stg}	Operating and Storage Temperature Range		-40 to +150		°C	
Symbol	**Parameter**	**Min.**	**Typ.**	**Max.**	**Unit**	**Test Conditions**
Static characteristics						
$R_{DS(on)}$	Static Drain-source on Resistance	-	4.0	5.5	mΩ	V_{GS}=18V; I_D=200A; T_C=25°C
Dynamic characteristics						
Q_G	Total Gate Charge	-	952	-	nC	V_{DD}=800V; V_{GS}=-5/+18V; I_D=200A; T_C=25°C
Q_{GD}	Gate-drain Charge	-	312.9	-		
Source-drain diode						
Q_{RR}	Reverse Recovery Charge	-	2452	-	nC	V_{GS}=-5/+18V; I_F=200A; V_R=800V; T_J=25°C

Absolute Maximum Ratings (at T_C=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{DS}	Drain-source Voltage	-	-	1200	V
V_{GS}	Gate-source Voltage	-10	-	+22	V
I_{DC}	Continuous DC Drain Current	-	400	-	A
I_{DRM}	Repetitive Peak Drain Current	-	800	-	A
T_{op}; T_{stg}	Operating and Storage Temperature Range	-40	-	+150	°C
L_{Stray}	Stray Inductance	-	-	20	nH
V_{isol}	Isolation Test Voltage (f=50Hz; t=1min)	-	3.0	-	kV
M	Mounting Torque for Module Mounting, Screw M5	3.0	-	6.0	Nm
G	Weight	-	300	-	g
$R_{th\ JC}$	Thermal Resistance, Junction-to-heatsink	-	0.12	-	°C/W

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T_C=25°C unless otherwise specified)						
BV_{DS}	Drain-source Breakdown Voltage	1200	-	-	V	V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current	-	-	200	μA	V_{DS}=1200V; V_{GS}=0V
I_{GSS}	Gate-body Leakage Current	-	-	2	μA	V_{GS}=-10/+20V; V_{DS}=0V
$V_{GS(th)}$	Gate Threshold Voltage	2	-	4	V	V_{DS}=V_{GS}; I_D=40mA
$R_{DS(on)}$	Static Drain-source on Resistance	-	4.0	5.5	mΩ	V_{GS}=18V; I_D=200A
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
C_{iss}	Input Capacitance	-	27.5	-	nF	V_{DS}=1000V; f=1MHz; V_{AC}=25mV
C_{oss}	Output Capacitance	-	1.15	-		
C_{rss}	Reverse Transfer Capacitance	-	52	-	pF	
E_{on}	Turn-on Switching Energy	-	10.4	-	mJ	V_{DS}=800V; V_{GS}=-5/+18V; I_D=200A; Load=100μH
E_{off}	Turn-off Switching Energy	-	2.9	-		
Q_{GS}	Gate-source Charge	-	306.7	-	nC	V_{DD}=800V; V_{GS}=-5/+18V; I_D=200A
Q_{GD}	Gate-drain Charge	-	312.9	-		
Q_G	Total Gate Charge	-	952	-		
$R_{G(int)}$	Internal Gate Resistor	-	0.8	-	Ω	f=1MHz; V_{AC}=25mV
$t_{d(on)}$	Turn-on Delay Time	-	104	-	ns	V_{DD}=800V; V_{GS}=-5/+18V; I_D=200A; $R_{G(ext)}$=5Ω
t_r	Rise Time	-	68	-		
$t_{d(off)}$	Turn-off Delay Time	-	328	-		
t_f	Fall Time	-	69	-		

Body Diode Characteristics (at T_J=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{FSD}	Forward Voltage	-	-	6	V	V_{GS}=0V; I_F=200A
I_S	Continuous Diode Forward Current	-	200	-	A	V_{GS}=0V; T_C=25°C
t_{RR}	Reverse Recovery Time	-	55	-	ns	V_{GS}=-5/+18V; I_F=200A; V_R=800V
Q_{RR}	Reverse Recovery Charge	-	2452	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	76	-	A	

NTC Thermistor Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R_{25}	Rated Resistance	-	5.00	-	kΩ	T_C=25°C
ΔR/R	Deviation of R_{100}	-5	-	5	%	T_C=100°C; R_{100}=493.3Ω
$B_{25/50}$	Beta Value for 25°C to 50°C	-	3375	-	K	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$
$B_{25/80}$	Beta Value for 25°C to 80°C	-	3414	-	K	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$
$B_{25/100}$	Beta Value for 25°C to 100°C	-	3436	-	K	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$

Typical Performance

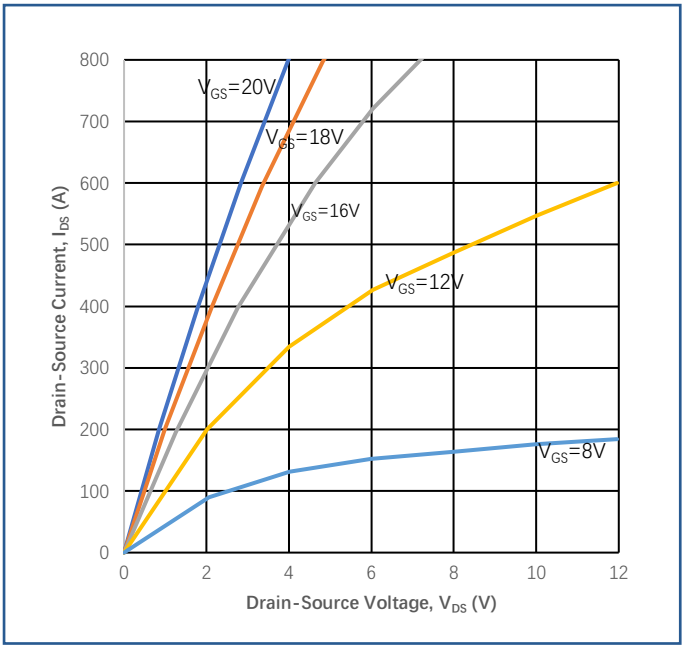


Figure 1

Output Characteristics (T_J=25 °C)

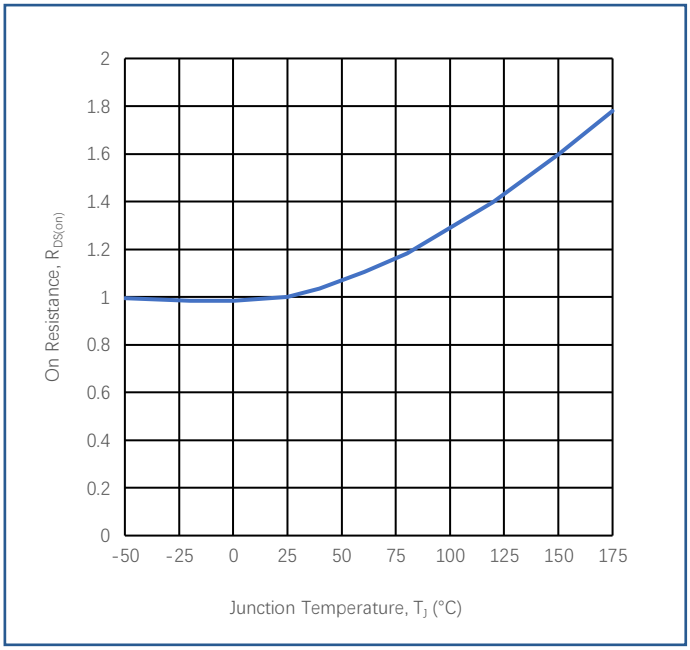


Figure 2

Normalized on-resistance vs. Temperature

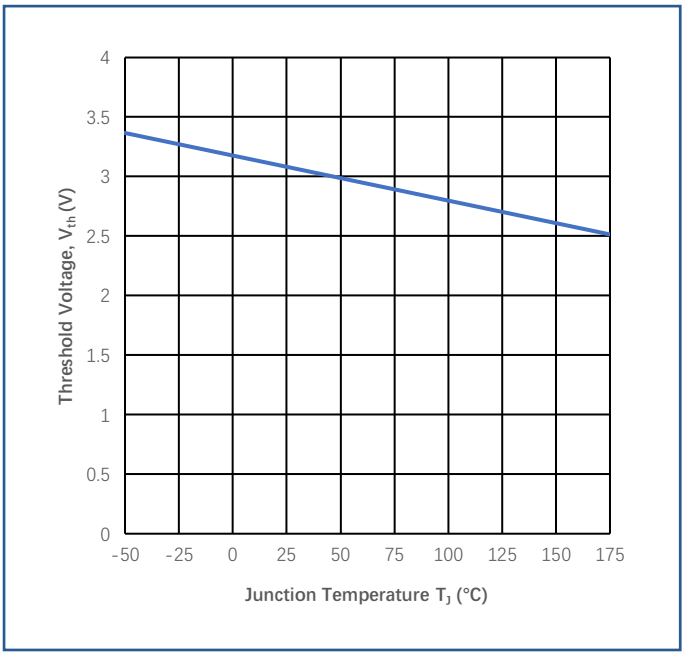


Figure 3

Threshold Voltage vs. Temperature

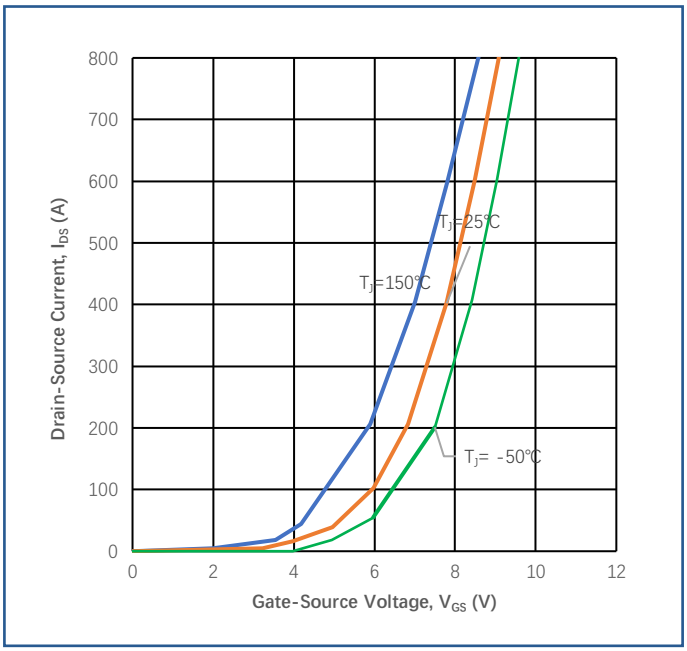


Figure 4

Transfer Characteristic for Various T_J

Typical Performance

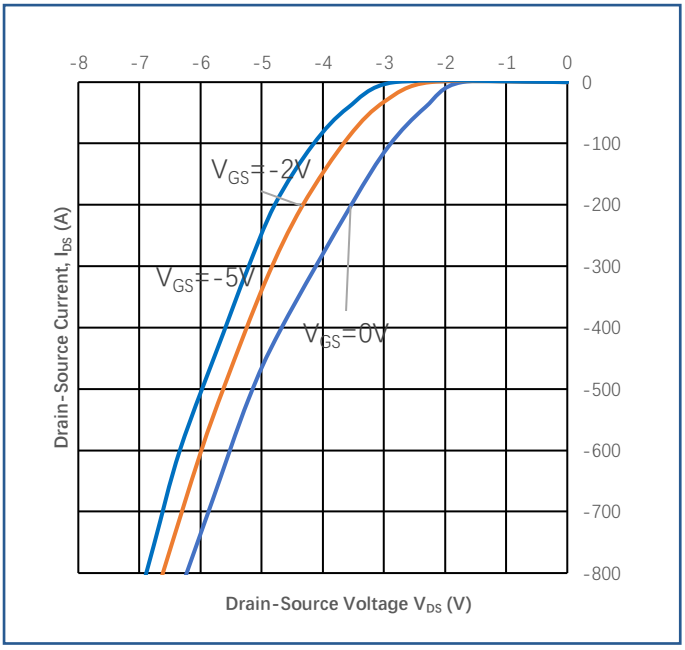


Figure 5
Diode Characteristic at 25 ˚C

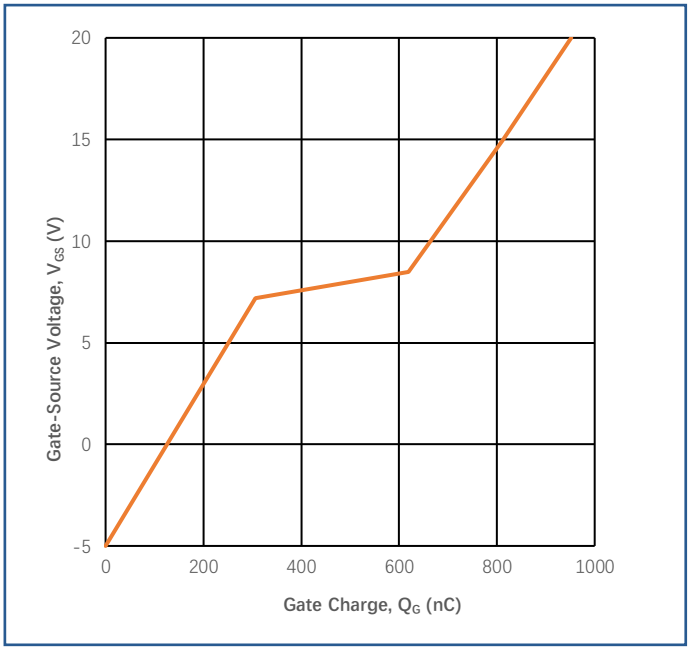


Figure 6
Typical Gate Charge Characteristics

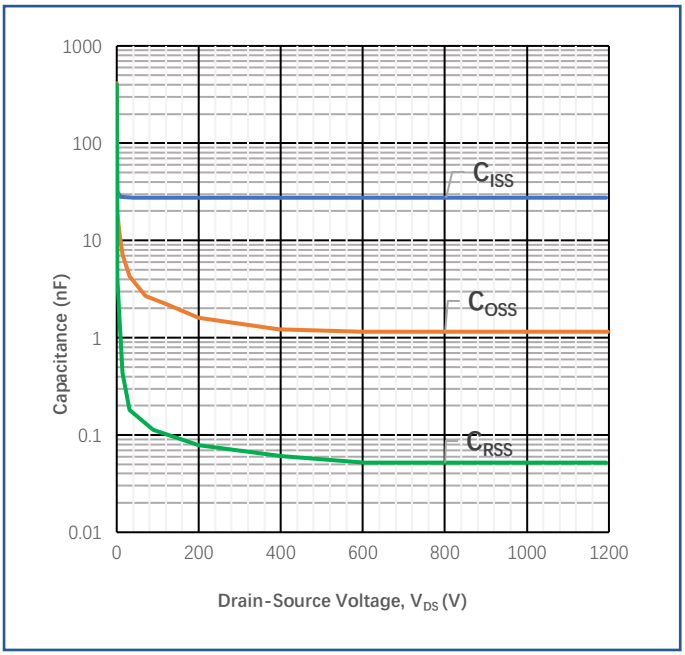


Figure 7
Typical Capacitances vs. Drain-source Voltage

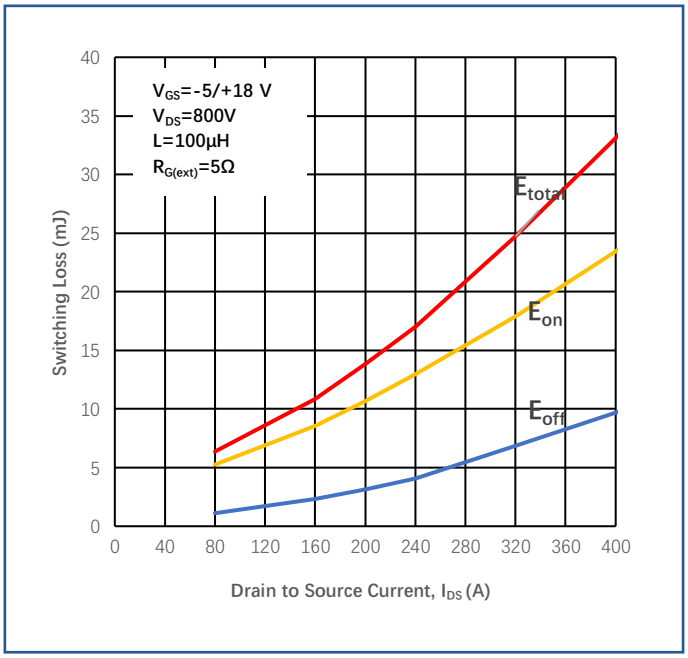


Figure 8
Inductive Switching Energy vs. Drain Current

Typical Performance

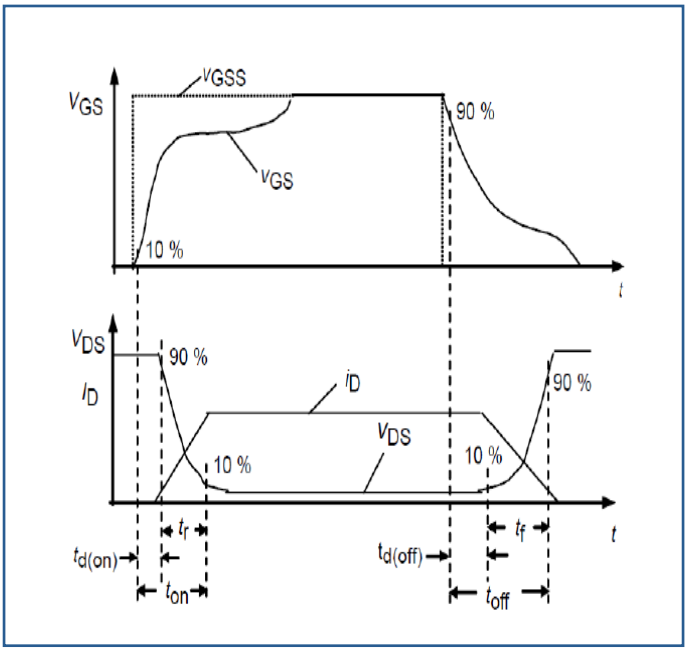


Figure 9

Switching Time Description

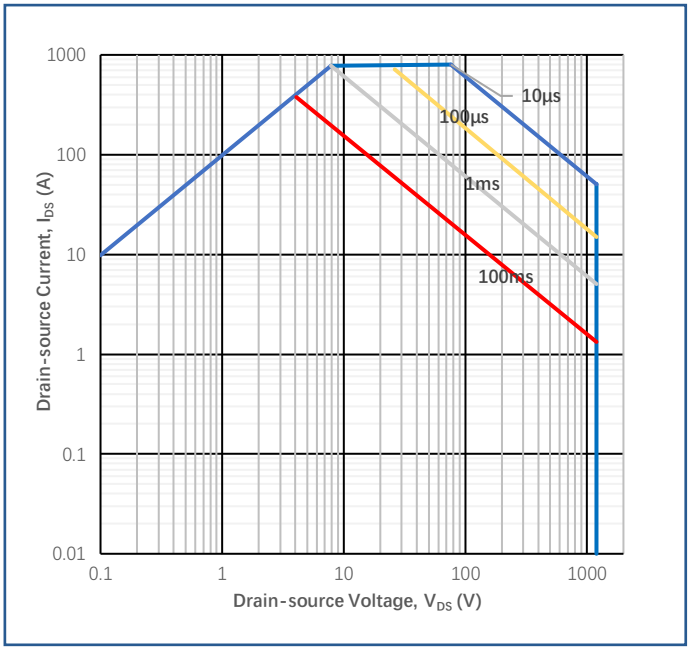
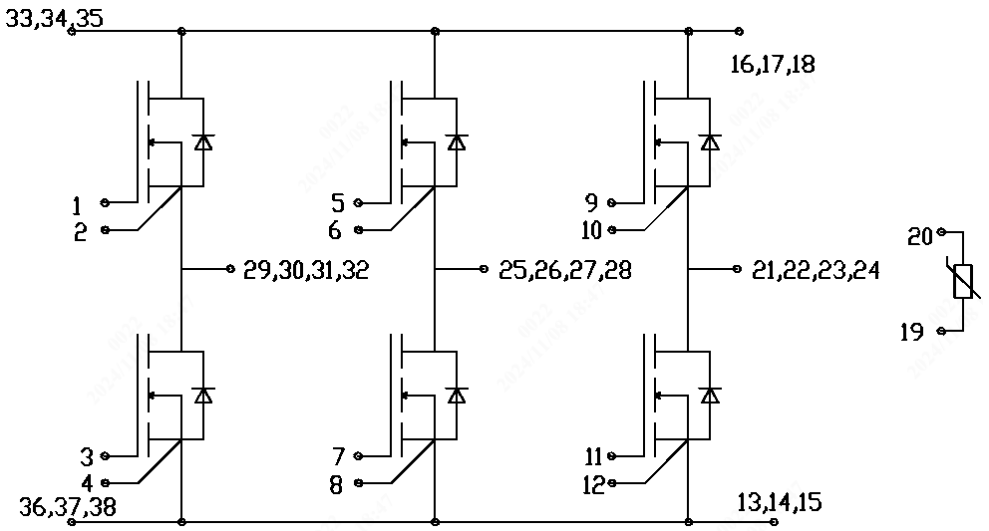


Figure 10

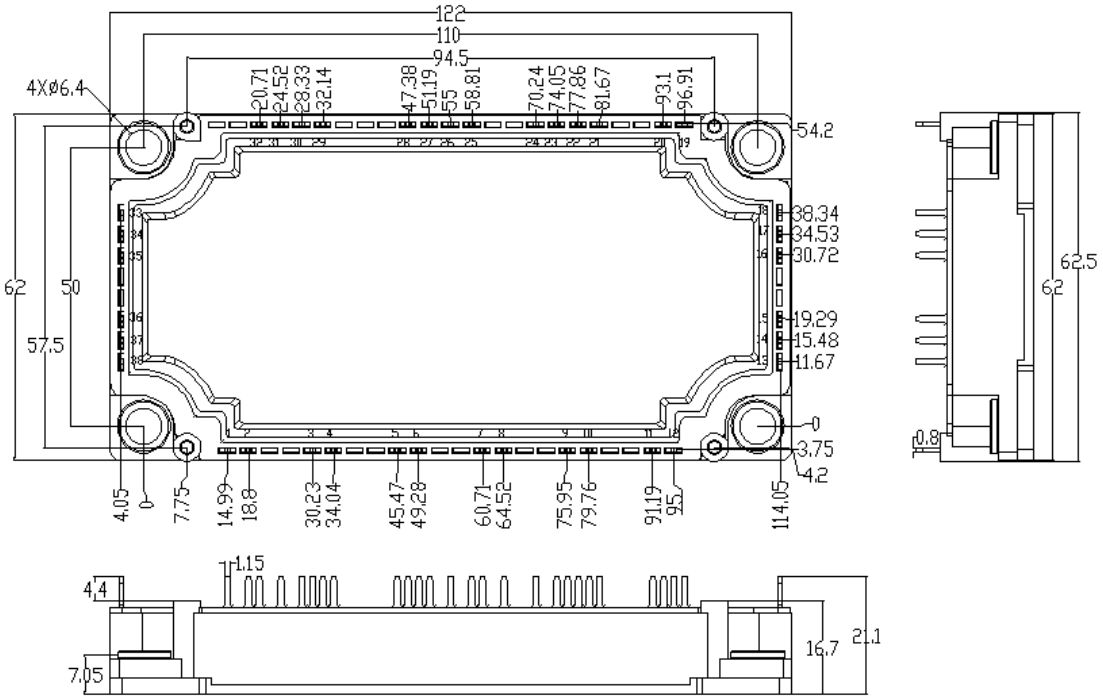
Safe Operating Area

Circuit Diagram Headline



Package Dimensions (mm)

Package Type：EK6



未标注线性公差按 GB/1804-2000c 级执行	公差分段	0.5-3	3-6	6-30	30-120	120-400
	c 级	±0.2	±0.3	±0.5	±0.8	±1.2

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