ASC800N1200DCS12

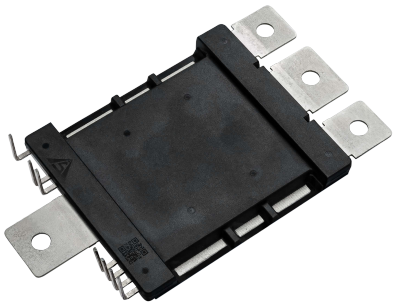
1200V, 800A, Half-Bridge, Silicon Carbide MOSFET Module

Product Data Sheet ASTC-3T03-02A A/1

爱仕特科技
AST TECHNOLOGY

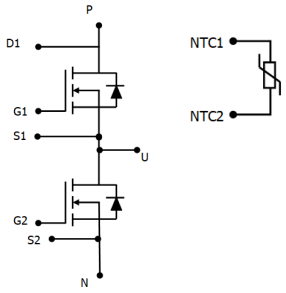
General Description

The AST-DCS12 module incorporates AST's 1200V Gen3 N-channel SiC MOSFET. NTC temperature sensor inside.



Features

- High Temperature, Humidity, and Bias Operation
- Ultra Low Loss < 5nH
- High-Frequency Operation
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-Safe Device Operation
- Copper Baseplate and Silicon Nitride Insulator



Benefits

- Enables Compact, Lightweight, Efficient Systems
- Harsh Outdoor Environment Installation
- Mitigates Over-Voltage Protection
- Reduced Thermal Requirements
- Reduced System Cost

Applications

- Traction Inverter for New Energy Vehicles
- Aviation Controller
- Industrial Controller

Ordering Informations

Order Number	ASC800N1200DCS12
Marking	ASC800N1200DCS12
Package Type	DCS12

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V_{DS}	Drain-Source Voltage		1200		V	T_C=25°C
I_D	Drain Current (Continuous)		800		A	T_C=25°C
T_j	Junction Temperature		175		°C	
Symbol	**Parameter**	**Min.**	**Typ.**	**Max.**	**Unit**	**Test Conditions**
Static characteristics						
$R_{DS(on)}$	Static Drain-Source on Resistance	-	2.0	2.7	mΩ	V_{GS}=18V; I_D=400A; T_C=25°C
Dynamic characteristics						
Q_G	Total Gate Charge	-	1904	-	nC	V_{DD}=800V; V_{GS}=-5/+18V; I_D=400A; T_C=25°C
Q_{GD}	Gate-Drain Charge	-	626.4	-		
Source-drain diode						
Q_{RR}	Reverse Recovery Charge	-	2100	-	nC	V_{GS}=-5/+18V; I_F=400A; V_R=800V; Load=50μH; T_J=25°C

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	1200	V
V_{GS}	Gate-Source Voltage (Dynamic)	-10/+22	V
I_D	Drain Current (Continuous; T_C=25°C)	800	A
	Drain Current (Continuous; T_C=80°C)	610	
I_{DM}	Drain Current (Pulsed)	1600	A
T_{op}; T_{stg}	Operating and Storage Temperature Range	-40 to +175	°C
T_J	Junction Temperature	175	°C
L_{Stray}	Stray Inductance	5	nH
V_{isol}	Isolation Test Voltage (DC; 2mA; t=10s)	4.2	kV
$R_{\theta Jh}$	Thermal Resistance, Junction-to-Heatsink (per MOSFET; 8 L/min; T_F=65°C)	0.07	°C/W

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T_C=25℃ unless otherwise specified)						
BV_{DS}	Drain-Source Breakdown Voltage	1200	-	-	V	V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current	-	-	400	μA	V_{DS}=1200V; V_{GS}=0V
I_{GSS}	Gate-Body Leakage Current	-	-	4.0	μA	V_{GS}=-10/+20V; V_{DS}=0V
$V_{GS(th)}$	Gate Threshold Voltage	2.0	-	4.0	V	V_{DS}=V_{GS}; I_D=80mA
$R_{DS(on)}$	Static Drain-Source on Resistance	-	2.0	2.7	mΩ	V_{GS}=18V; I_D=400A
$V_{GS(on)}$	Recommended Turn-on Voltage	-	18	-	V	Static
$V_{GS(off)}$	Recommended Turn-off Voltage	-	-5	-	V	
R_G	Gate Resistance	-	0.27	-	Ω	V_{AC}=25mV; f=1MHz
Dynamic characteristics (at T_C=25℃ unless otherwise specified)						
C_{iss}	Input Capacitance	-	55.0	-	nF	V_{DS}=1000V; f=100kHz; V_{AC}=25mV
C_{oss}	Output Capacitance	-	2.3	-		
C_{rss}	Reverse Transfer Capacitance	-	104	-	pF	
E_{on}	Turn-on Energy	-	25.1	-	mJ	V_{DD}=800V; V_{GS}=-5/+18V; I_D=400A; $R_{G(ext)}$=5.0Ω; Load=50μH
E_{off}	Turn-off Energy	-	18.3	-		
Q_{GS}	Gate-Source Charge	-	613.6	-	nC	V_{DD}=800V; V_{GS}=-5/+18V; I_D=400A
Q_{GD}	Gate-Drain Charge	-	626.4	-		
Q_G	Total Gate Charge	-	1904	-		
$t_{d(on)}$	Turn-on Delay Time	-	138	-	ns	V_{DD}=800V; V_{GS}=-5/+18V; I_D=400A; $R_{G(ext)}$=5.0Ω; Load=50μH
t_r	Rise Time	-	118	-		
$t_{d(off)}$	Turn-off Delay Time	-	492	-		
t_f	Fall Time	-	78	-		

Body Diode Characteristics (at TJ=25℃ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{FSD}	Forward Voltage	-	3.9	6	V	V_{GS}=0V; I_F=400A
I_S	Continuous Diode Forward Current	-	400	-	A	V_{GS}=0V; T_C=25°C
t_{RR}	Reverse Recovery Time	-	71	-	ns	V_{GS}=-5/+18V; I_F=400A; V_R=800V; $R_{G(off)}$=5Ω; Load=50μH
Q_{RR}	Reverse Recovery Charge	-	2100	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	120	-	A	

NTC Thermistor Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
R_{25}	Rated Resistance	-	5.00	-	kΩ	T_{NTC}=25°C
ΔR/R	Deviation of R_{100}	-5	-	5	%	T_{NTC}=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

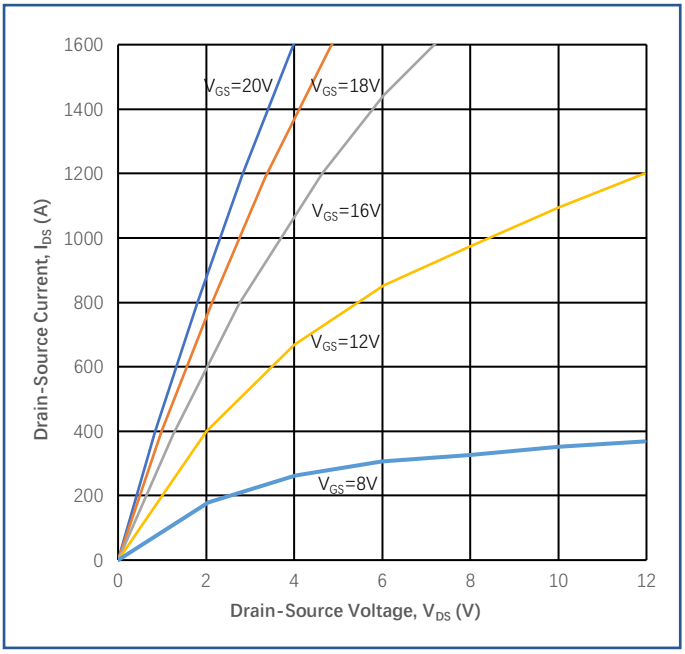


Figure 1

Output Characteristics (T_J=25°C)

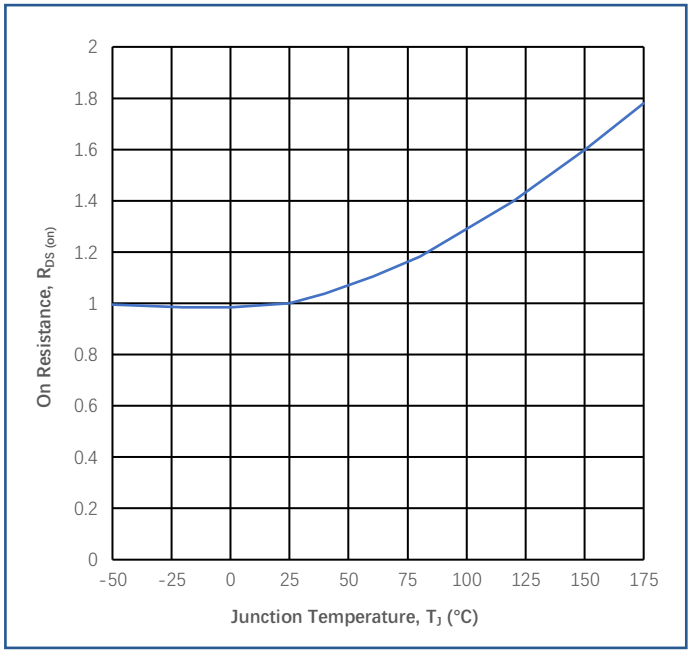


Figure 2

Normalized On-Resistance vs. Temperature

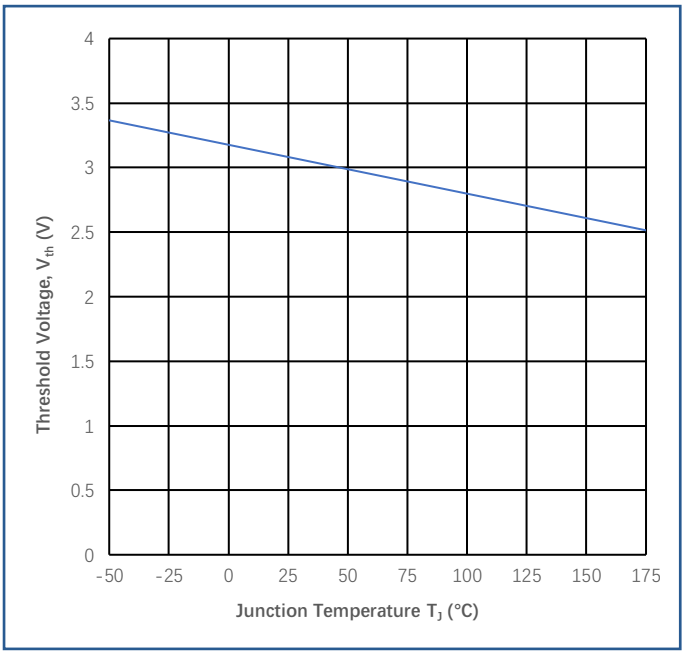


Figure 3

Threshold Voltage vs. Temperature

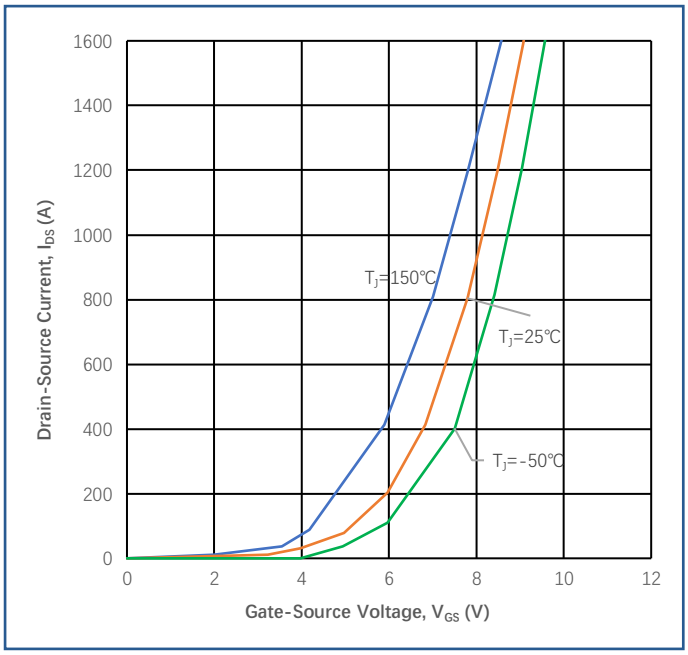


Figure 4

Transfer Characteristic for Various T_J; V_{DS}=20V

Typical Performance

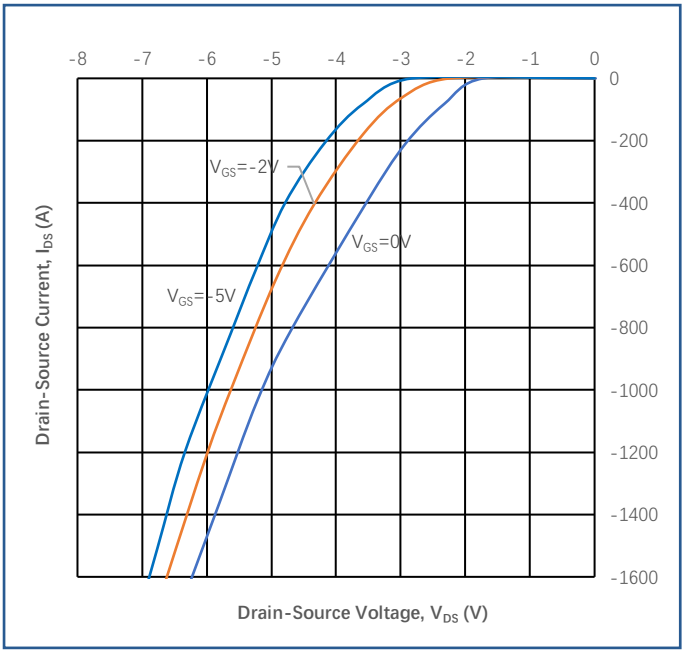


Figure 5

Diode Characteristic at 25°C

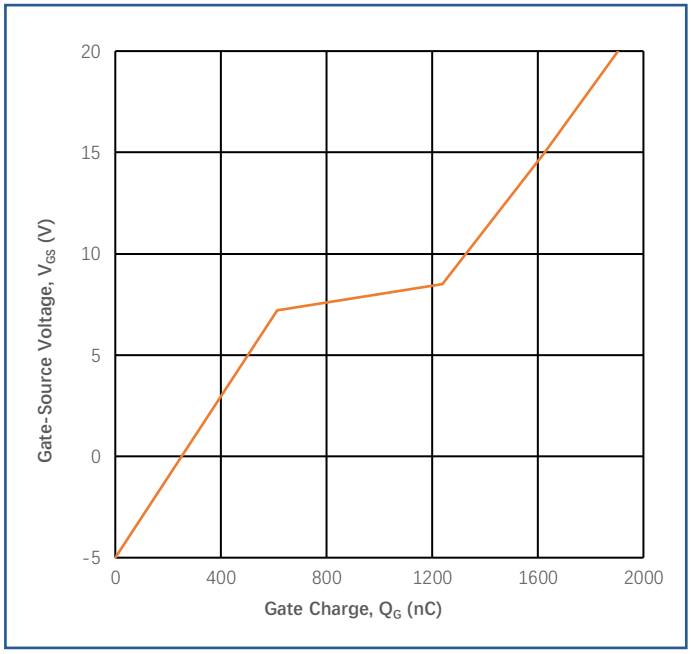


Figure 6

Typical Gate Charge Characteristics

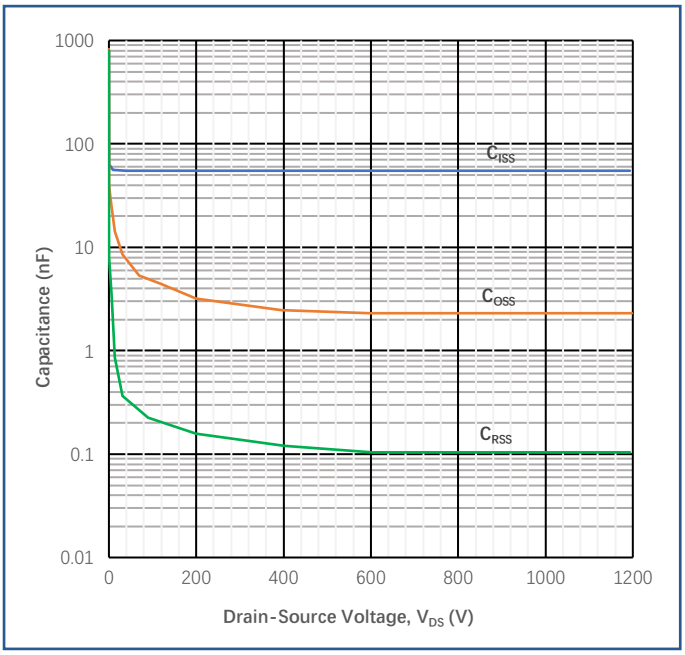


Figure 7

Typical Capacitances vs. Drain-Source Voltage

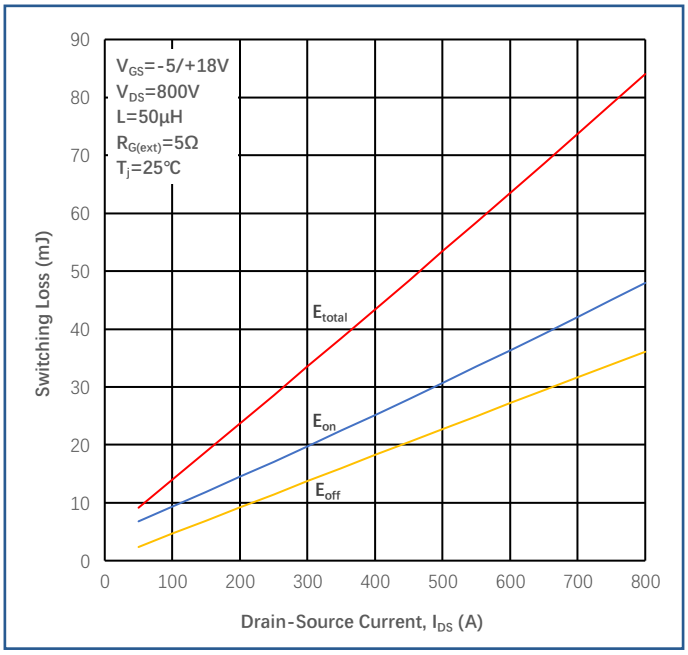


Figure 8

Inductive Switching Energy vs. Drain Curren

Typical Performance

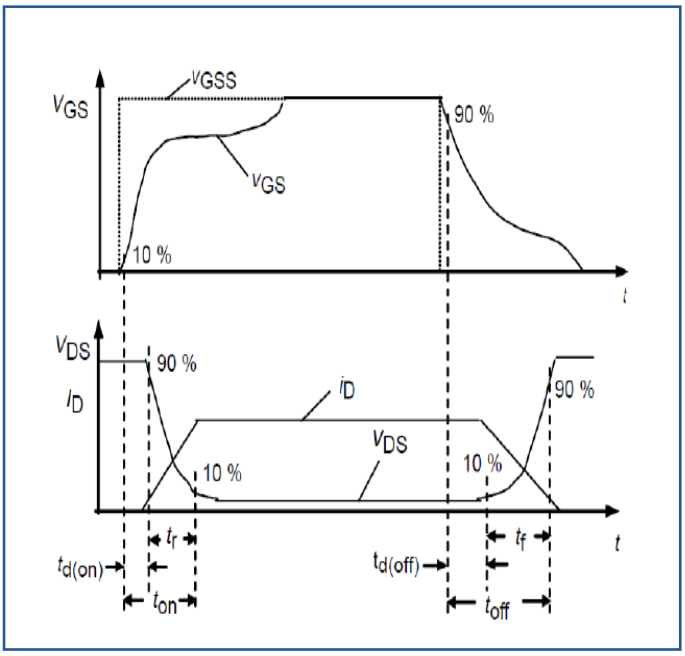


Figure 9
Switching Time Description

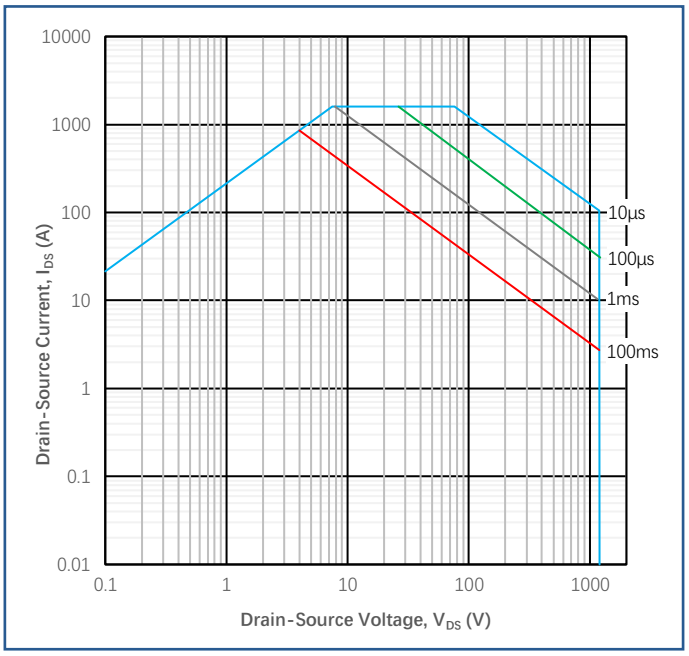
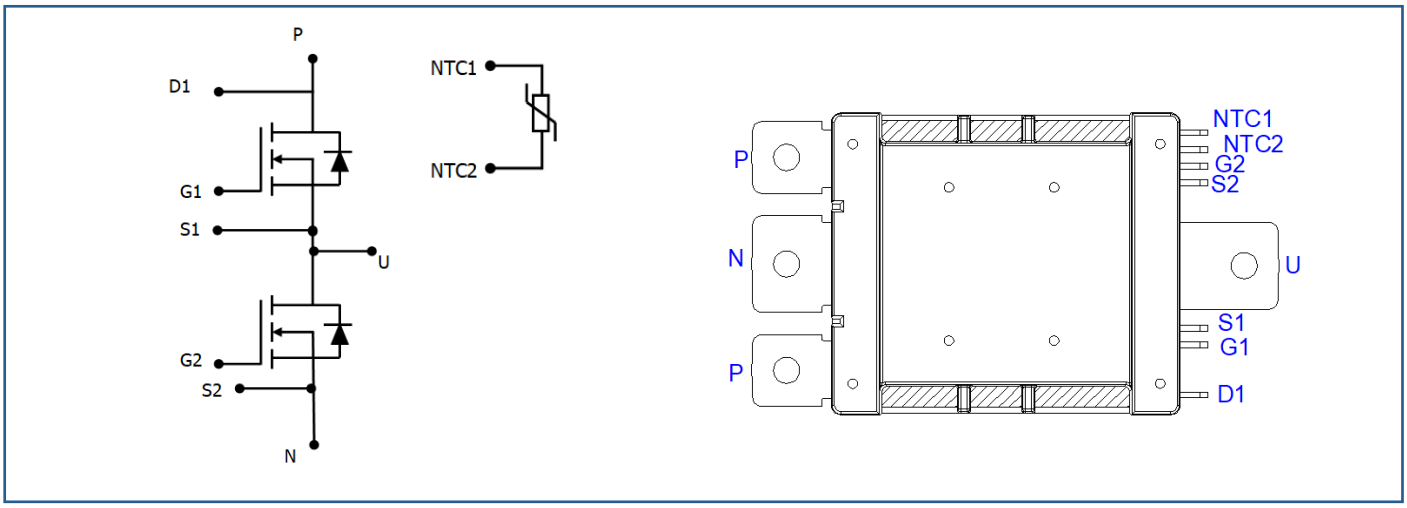


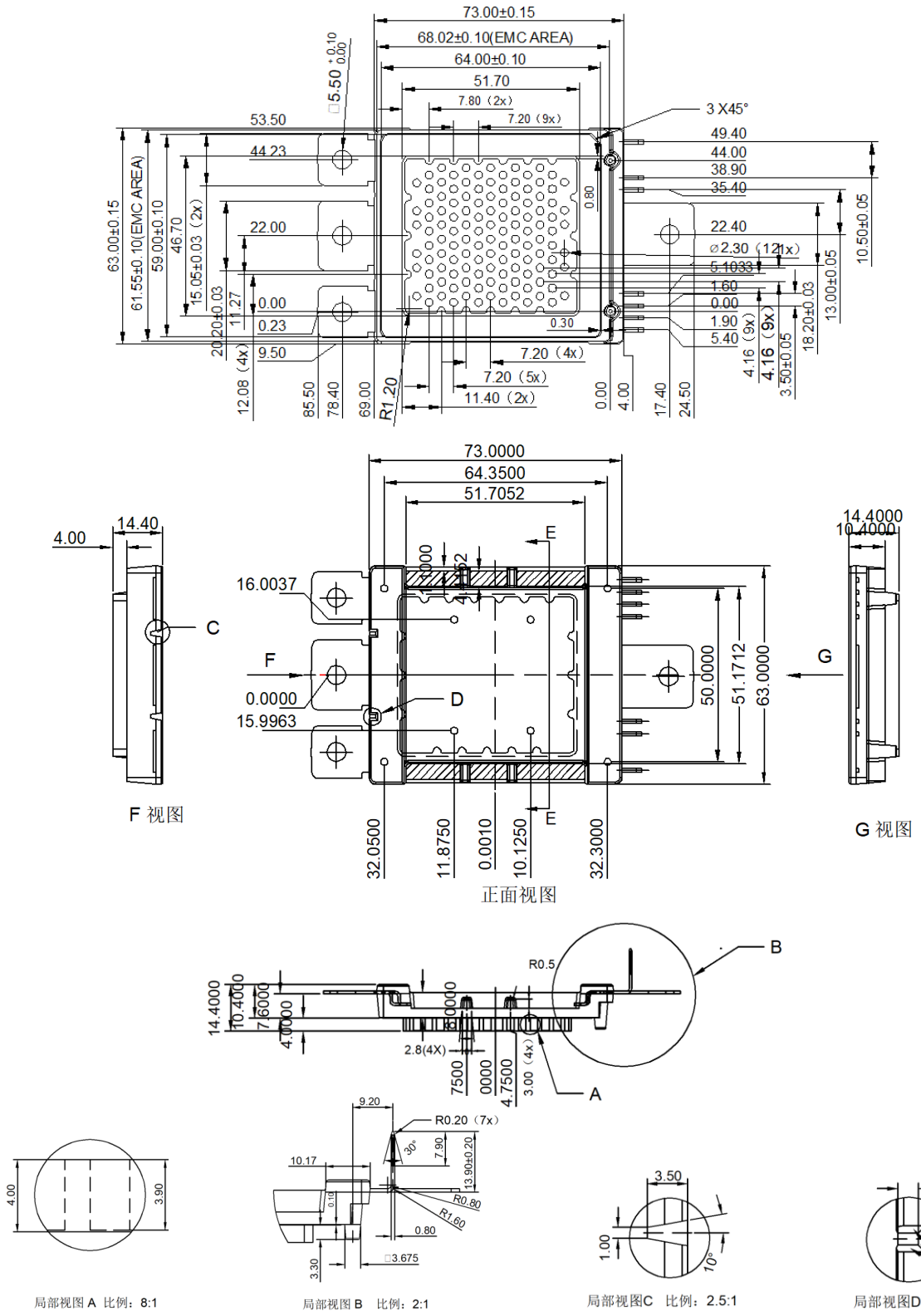
Figure 10
Safe Operating Area

Circuit Diagram Headline



Package Dimensions(mm)

Package Type：DCS12



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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