ASC800N1700DCS12

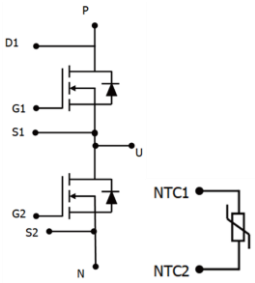
1700V, 800A, Half-Bridge, Silicon Carbide MOSFET Module

Product Data Sheet ASTC-3T03-04A A/0

爱仕特科技
AST TECHNOLOGY

General Description

AST DCS12 series Silicon Carbide MOSFET module with AST 1700V Gen3 N-channel SiC MOSFET and PinFin cooler type, 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
- Cu 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

- New Energy Vehicle Main Drive Inverter
- Aviation Controller
- Industrial Control

Ordering Informations

Order Number / Marking	ASC800N1700DCS12
Package Type	DCS12

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V_{DS}	Drain-Source Voltage		1700		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						
$R_{DS(on)}$	Drain-Source On-State Resistance	-	3.25	3.75	mΩ	V_{GS}=18V; I_D=400A; T_C=25°C
Dynamic characteristics						
Q_G	Total Gate Charge	-	1344	-	nC	I_D=400A; V_{DD}=1200V V_{GS}=-5/+18V ; T_C=25°C
Q_{GD}	Gate-Drain Charge	-	400	-		
Source-drain diode						
Q_{RR}	Reverse Recovered Charge	-	3417.6	-	nC	V_{GS}=-5V; I_{SD}=400A; V_R=1200V T_J=25°C

Absolute Maximum Ratings

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	1700	V
V_{GS}	Gate-Source Voltage (dynamic)	-10/+22	V
I_D	Drain Current (continuous)	800	A
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
$R_{th\ JC}$	Thermal Resistance, Junction to Cooling Fluid	0.12	°C/W

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T_j=25°C, unless otherwise specified)						
BV_{DS}	Drain-source Breakdown Voltage	1700	-	-	V	V_{GS}=0V
I_{DSS}	Zero Gate Voltage Drain Current	-	40	400	μA	V_{DS} =1700V; V_{GS} =0V
I_{GSS}	Gate-source Leakage Current	-	-	4	μA	V_{GS}=20V; V_{DS}=0V
$V_{GS(th)}$	Gate-sourse Threshold Voltage	2.0	-	4.0	V	V_{DS}= V_{GS}; I_D=80mA
$R_{DS(on)}$	Static Drain-source on Resistance	-	3.25	3.75	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	-	0.32	-	Ω	V_{AC}=25mV; f=1MHz
Dynamic characteristics (at T_j=25°C, unless otherwise specified)						
C_{iss}	Input Capacitance	-	51.7	-	nF	V_{DS}=1200V; f=100kHZ; V_{AC}=25mV
C_{oss}	Output Capacitance	-	1.58	-		
C_{rss}	Reverse Transfer Capacitance	-	128	-	pF	
E_{on}	Turn-on Energy Loss Per Pulse	-	51.7	-	mJ	V_{DS}=1200V; V_{GS}=-5/+18V I_D=400A; Load=100μH
E_{off}	Turn-off Energy Loss Per Pulse	-	43.3	-	mJ	
Q_{GS}	Gate-Source Charge	-	416	-	nC	V_{DS}=1200V; V_{GS}=-5/+18V; I_D=400A
Q_{GD}	Gate-Drain Charge	-	400	-		
Q_G	Total Gate Charge	-	1344	-		
$t_{d(on)}$	Turn-on Delay Time	-	77.5	-	nS	V_{DS}=1200V; V_{GS}=-5/+18V I_D=400A; $R_{G(ext)}$=5Ω; Load=50μH
t_r	Rise Time	-	94.8	-		
$t_{d(off)}$	Turn-off Delay Time	-	429	-		
t_f	Fall Time	-	86	-		

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{SD}	Body Diode Forward Voltage	-	3.6	6	V	V_{GS}=0V; I_{SD}=400A
I_{SD}	Continuous Diode Forward Current	-	400	-	A	V_{GS}=0V; T_C=25°C
t_{RR}	Reverse Recovery Time	-	66.3	-	ns	V_{GS}=-5V; I_{SD}=400A; V_R=1200V
Q_{RR}	Reverse Recovery Charge	-	3417.6	-	nC	
I_{RRM}	Peak Reverse Recovery Current	-	112	-	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

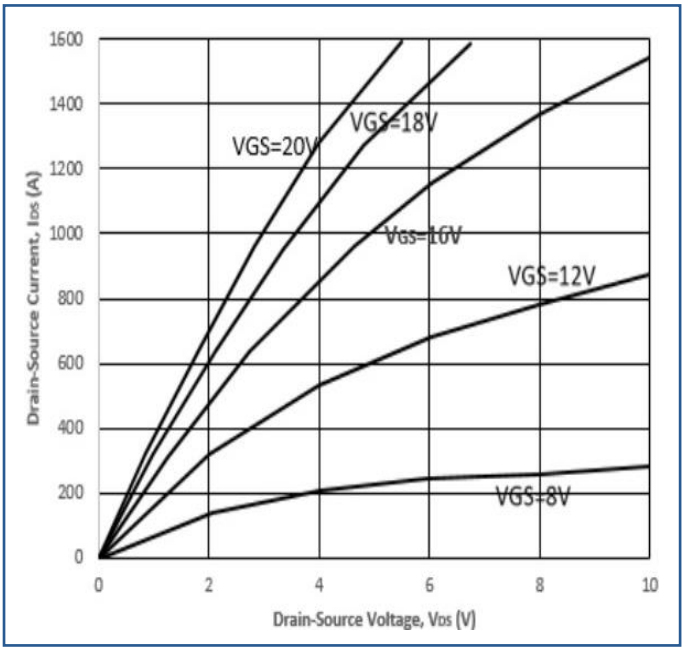


Figure 1

Output Characteristics (T_J=25 °C)

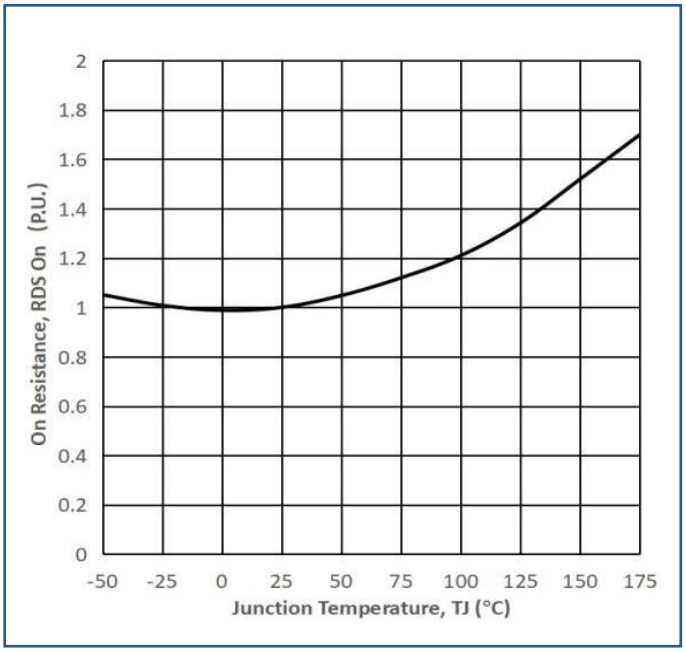


Figure 2

Normalized On-State Resistance vs. Junction Temperature

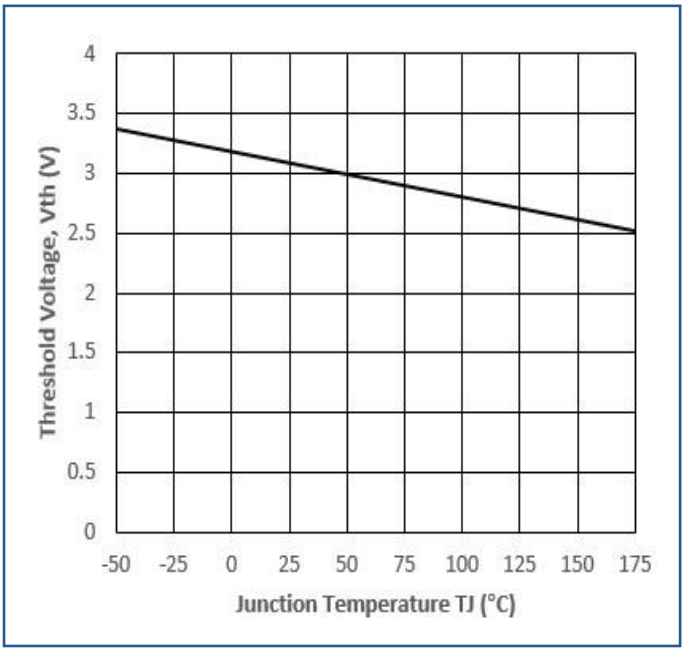


Figure 3

Threshold Voltage vs. Junction Temperature

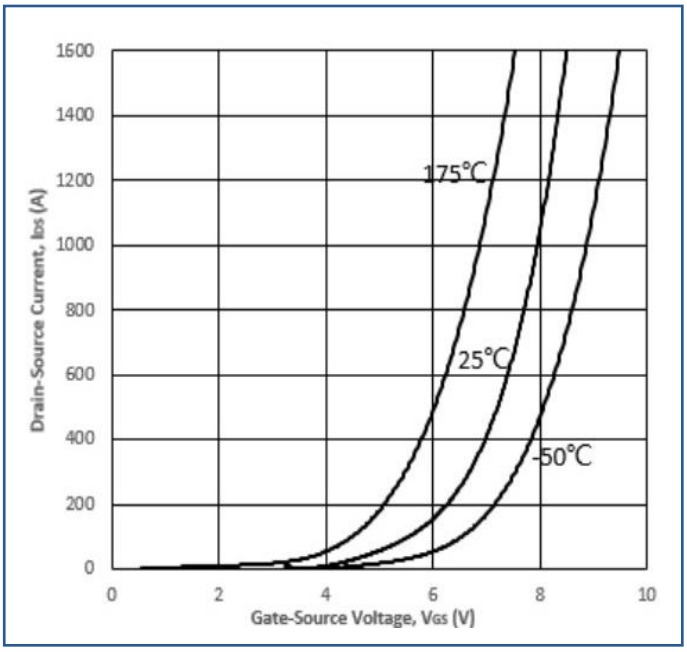


Figure 4

Transfer Characteristic for Various Junction Temperatures

Typical Performance

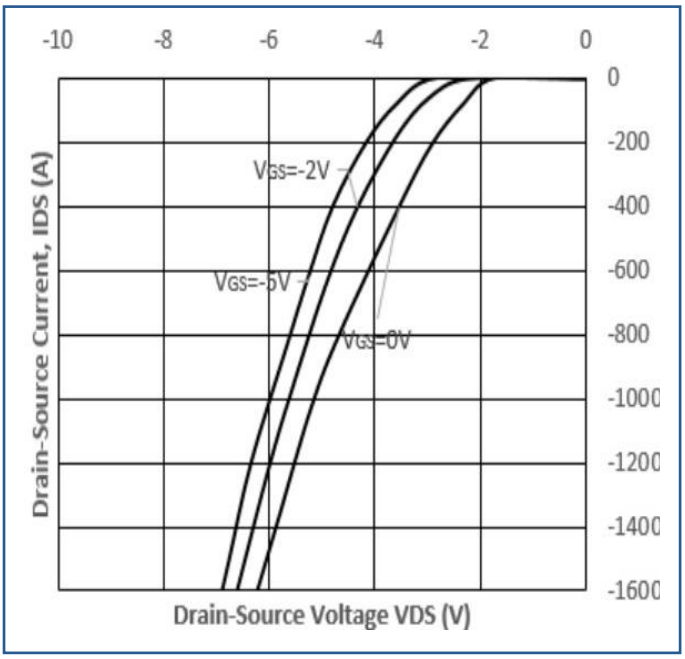


Figure 5

Body Diode Characteristic (T_J=25°C)

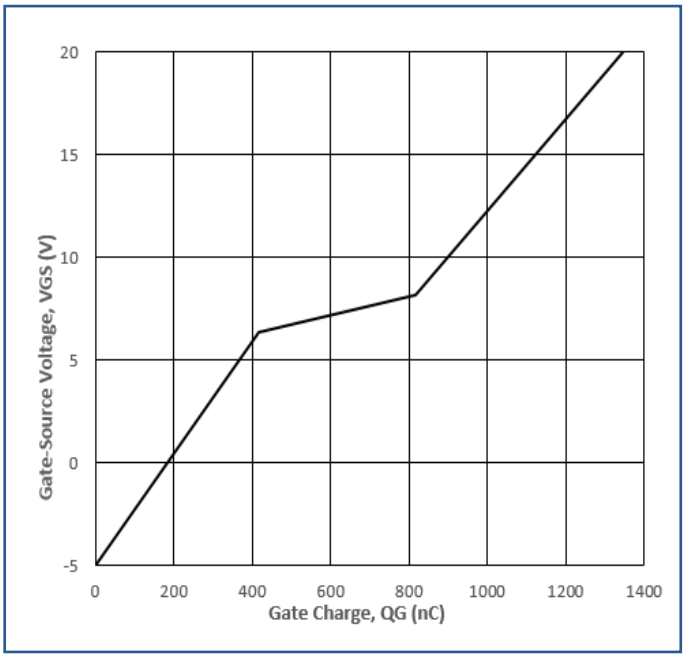


Figure 6

Typical Gate Charge Characteristics

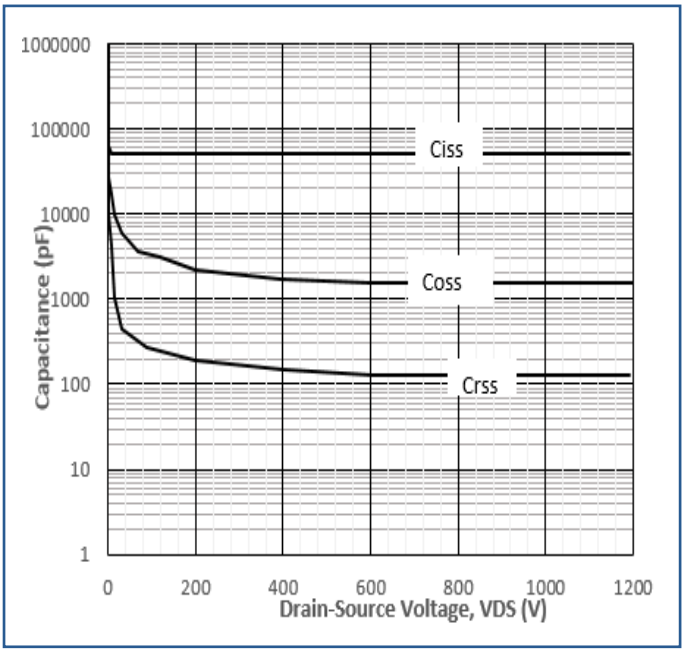


Figure 7

Typical Capacitances vs. Drain-Source Voltage

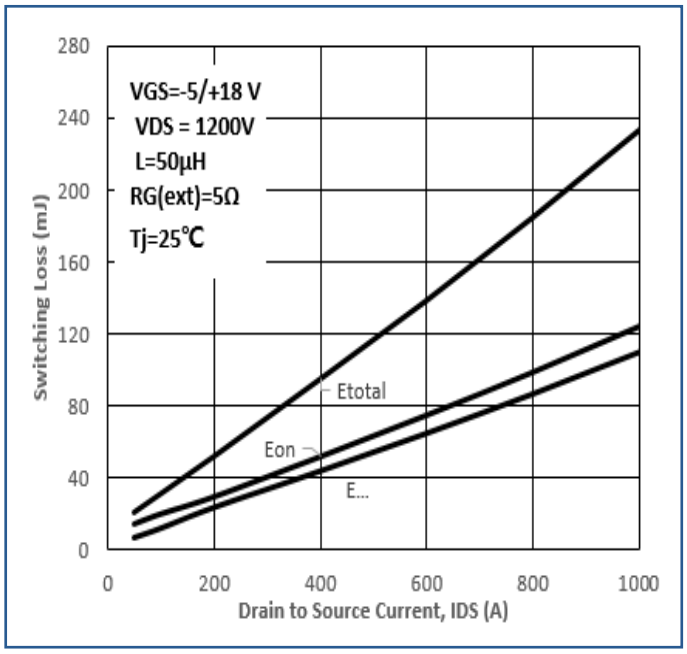


Figure 8

Inductive Switching Energy vs. Drain Current

Typical Performance

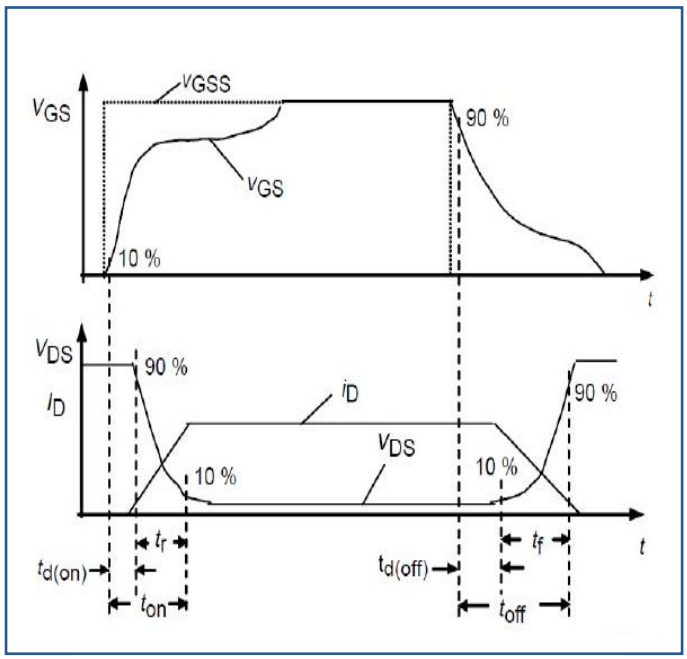


Figure 9
Switching Time Description

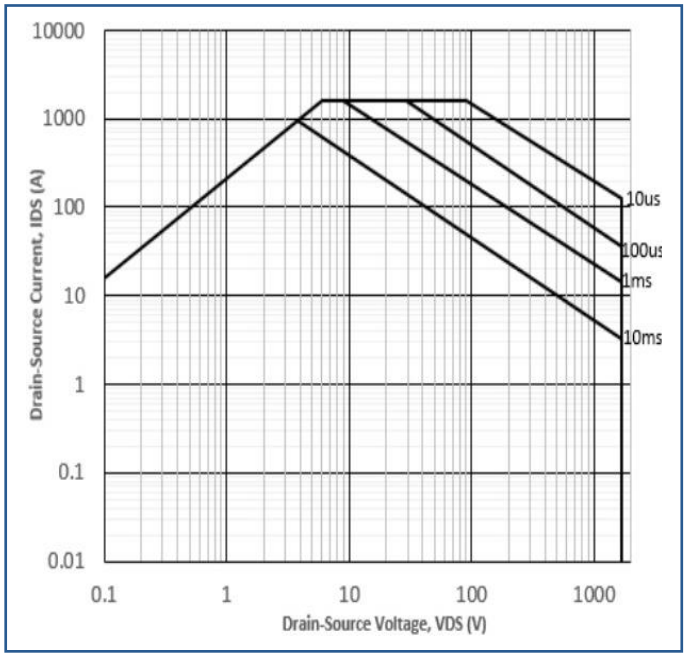
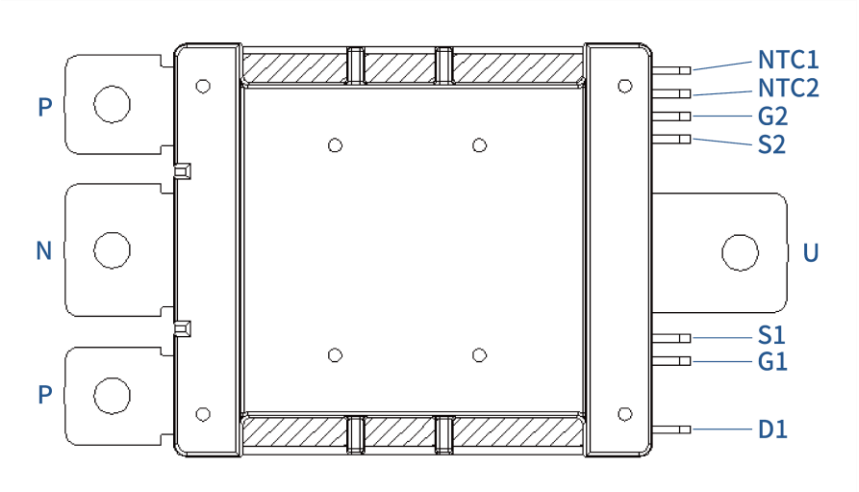
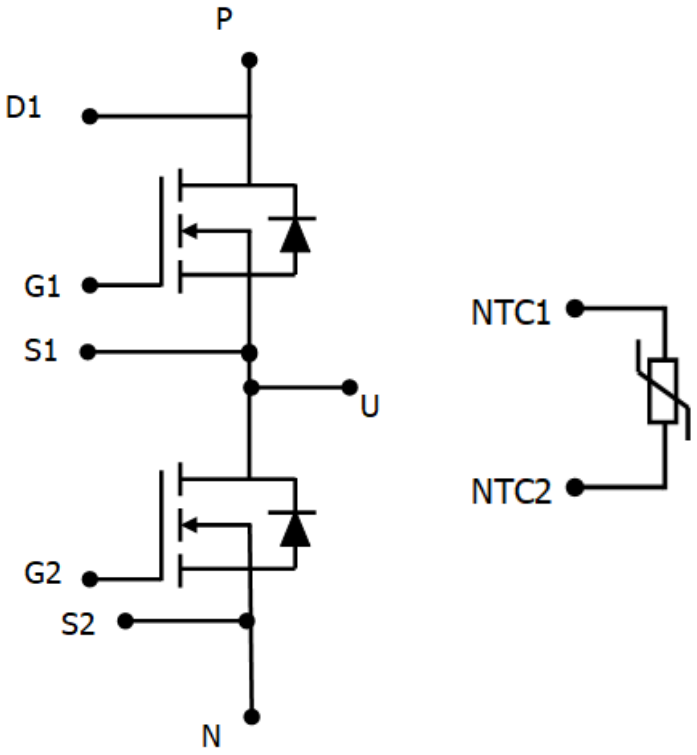


Figure 10
Safe Operating Area

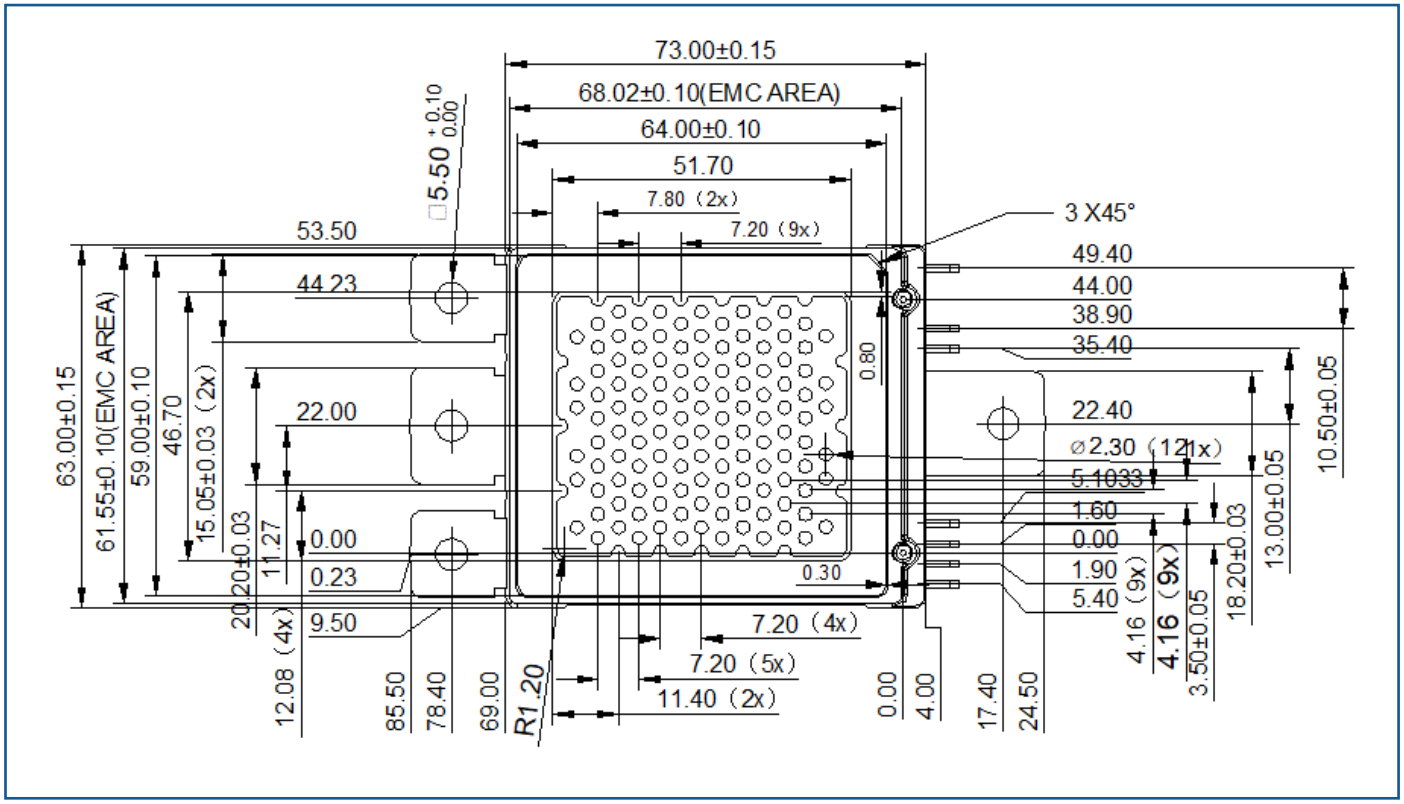
Schematic and Pin Out

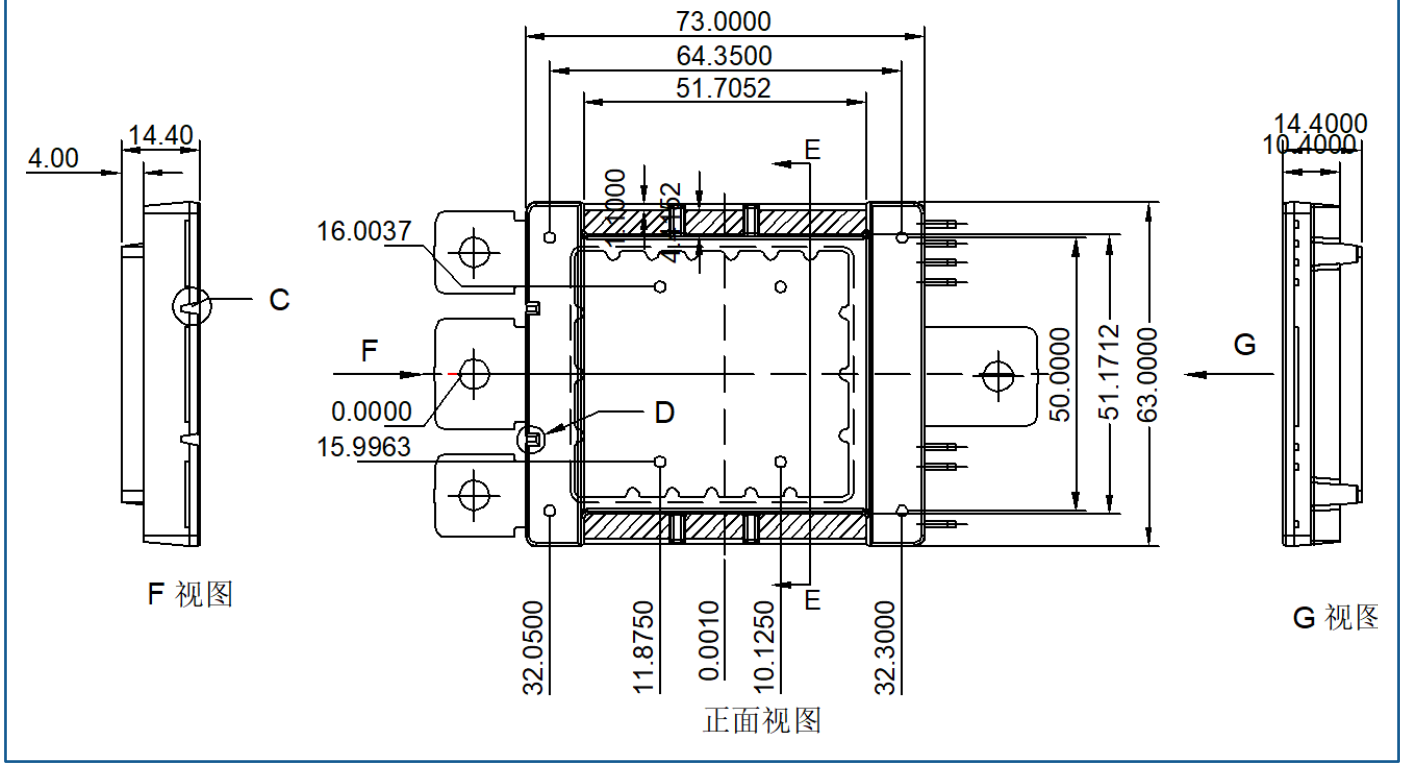




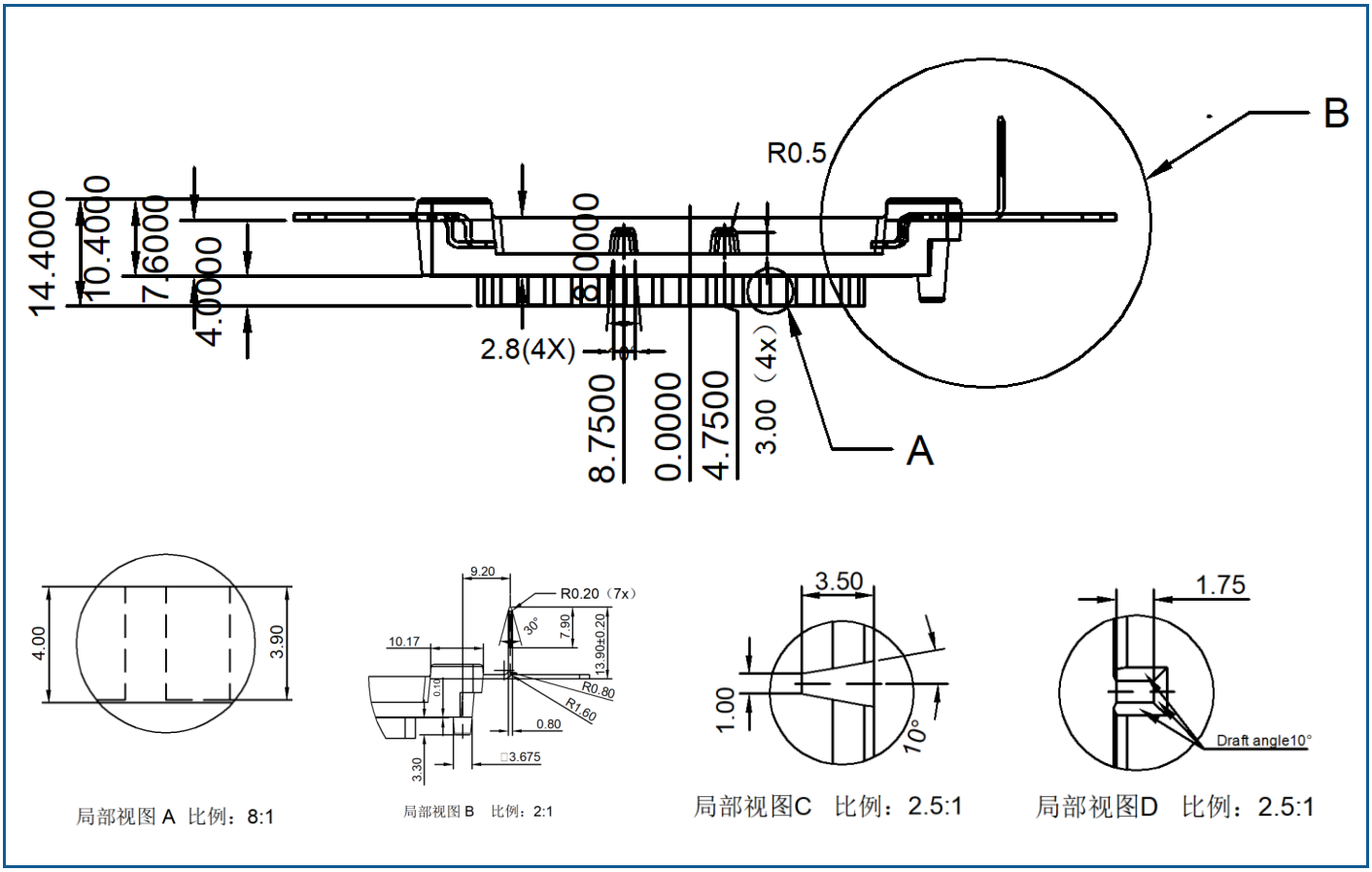
Package Dimensions (mm)

Package Type：DCS12





Package Dimensions (mm)



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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