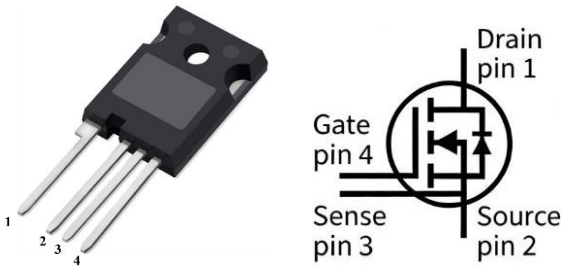
THC120R040K4

1200V 69A 40mΩ SiC N-Channel Planar Power MOSFET

This SiC N-Channel Power MOSFET is a high-voltage discrete power device designed for advanced power conversion systems. It provides a versatile switching solution for industria, automotive and energy applications.



Package view and circuit symbol

General Features

- Wide Bandgap SiC MOSFET Technology
- Low Capacitances with High-Speed Switching
- Low On Resistance with High Blocking Voltage
- Easy to Parallel and Simple to Drive
- Low Reverse Recovery
- High-temperature operation

Applications

- Power Factor Correction
- DC-AC Inverters
- High Voltage DC/DC Converters
- Switch Mode Power Supplies

Key Performance Parameters

Parameter	Value	Unit
V_{DSS}, min @ T_{J} = 25 °C	**1200**	V
T_J, maximum junction temperature	**175**	°C
I_D @ T_C = 25 °C	**69**	A
I_D @ T_C = 100 °C	**60**	A
$I_{D,pulse}$ @ T_C = 25 °C, tp limited by Tjmax.	**136**	A
$R_{DS(on)}$, typ. @ T_J = 25 °C ,V_{GS} = 18 V	**40**	mΩ
Qg, typ.	**80**	nC

RoHS SGS

Marking Information

Product Name	Package	Marking
THC120R040K4	TO-247-4	THC120R040K4

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Maximum Ratings (T_J = 25℃ unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain to Source Voltage		V_{DSS}	1200	V
Gate to Source Voltage		V_{GSS}	-10/+22	V
Recommended Operation Voltage of Gate to Source		V_{GSop}	-4/+18	V
Continuous Drain Current	V_{GS}=18V,T_C=25℃	I_D	69	A
	V_{GS}=18V,T_C=100℃		60	
Pulsed Drain Current	T_C=25℃ tp limited by T_{vjmax}	I_{DM}	136	A
Power Dissipation	T_C=25℃	P_D	283	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55 To +175	℃
Lead Temperature for Soldering Purposes		T_L	270	

Electerical Characteristics (T_J = 25℃ unless otherwise specified)

Parameter	Symbol	Test Condition		Value min.	Value typ.	Value max.	Unit
Drain-to-Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V,I_D=500μA		1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V V_{DS}=V_{DSS}	T_J=25℃	-	-	10	μA
Gate−to−Source leakage Current	I_{GSS}	V_{GS}=-5~18V,V_{DS}=0V		-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D=9mA	T_J=25℃	2.0	-	4.0	V
Drain-Source on-state resistance	$R_{DS(on)}$	V_{GS}=18V, I_D=40A	T_J=25℃	-	40	52	mΩ
		V_{GS}=18V, I_D=40A	T_J=175℃	-	62	-	mΩ
Gate resistance	Rg	V_{AC}=25mV,f=1MHz		-	2	-	Ω
Transconductance	g_{fs}	V_{DS}=20V,I_D=40A		-	22	-	S
Input Capacitance	C_{ISS}	V_{DS} = 800 V, V_{GS} = 0 V, f = 1 MHz		-	1860	-	pF
Output Capacitance	C_{OSS}			-	75	-	
Reverse Transfer Capacitance	C_{RSS}			-	7	-	
Total Gate Charge	Qg	V_{DS} = 800 V, V_{GS} = -4/18 V, I_D = 40 A		-	80	-	nC
Gate- Source charge	Qgs				3		

Gate-Drain charge	Qgd			13		
Turn−On Delay Time	td(on)	V_{DS} = 800 V V_{GS} = -4/18 V I_D = 40 A R_G = 10Ω T_J = 25℃	-	13	-	ns
Turn−Off Delay Time	td(off)		-	35	-	
Rise time	tr		-	30	-	
Fall time	tf		-	10	-	
Turn-On Energy	Eon			265		uJ
Turn-Off Energy	Eoff			45		

Diode Characteristics (T_J = 25℃ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Diode Continous Forward Current	I_S	T_C=25℃	-	-	68	A
Pulsed Diode Forward Current	I_{SM}		-	-	135	
Diode Forward Voltage	V_{SD}	V_{GS} = -4 V ,I_S = 20A T_J = 25℃	-	4.5	-	V
Reverse Recovery Time	trr	V_{GS} = -4 V ,V_R = 800 V I_S = 40 A, dI_S/dt = 800 A/μs,T_J = 25℃	-	28	-	ns
Reverse Recovery Charge	Qrr		-	6	-	uC
Peak Reverse Recovery Current	Irrm		-	5.3	-	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction−to−Case	R_{thJC}	0.53	℃/W
Thermal Resistance, Junction−to−Ambient	R_{thJA}	40	

Typical Performance Characteristics

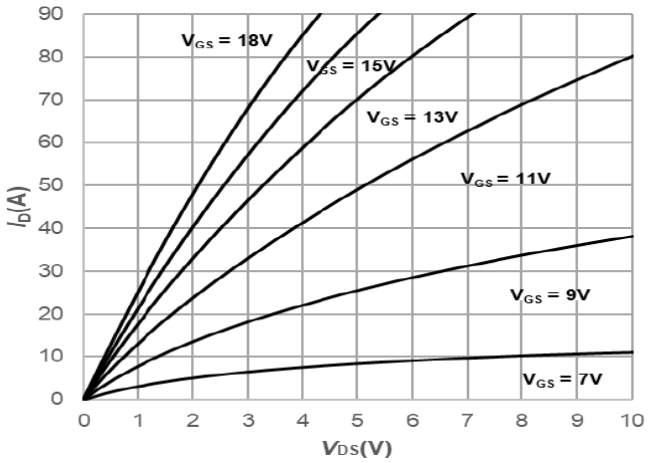


Fig 1. Typical output characteristic, T_J = 25℃

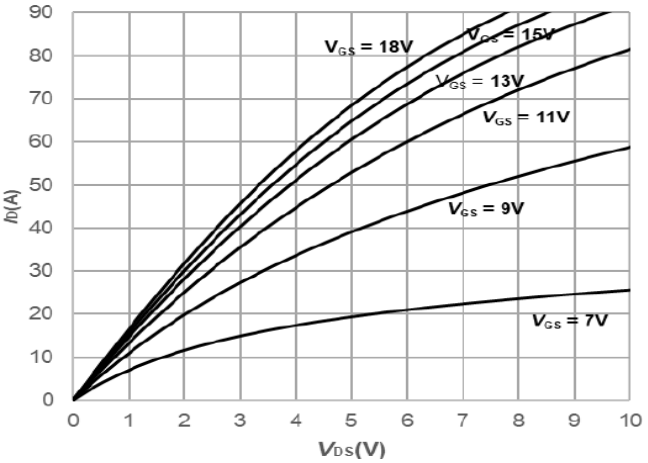


Fig 2. Typical output characteristic, T_J = 175℃

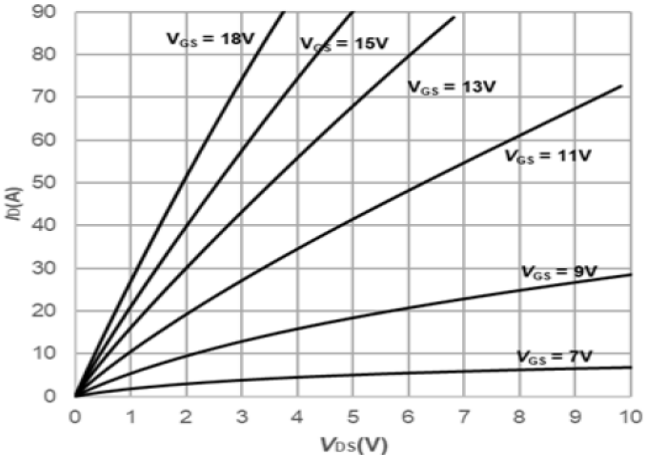


Fig 3. Typical output characteristic, T_J = -55℃

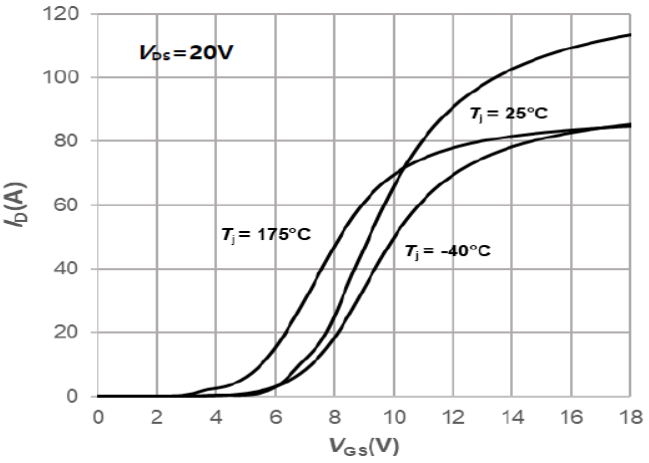


Fig 4. Typical transfer characteristic

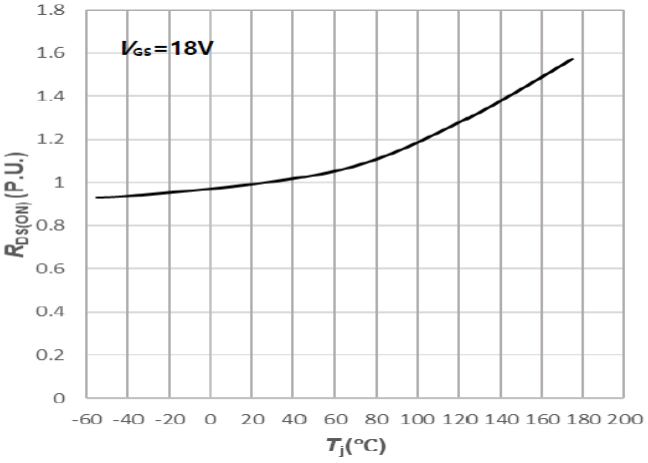


Fig 5. On-Resistance vs. Junction Temperature

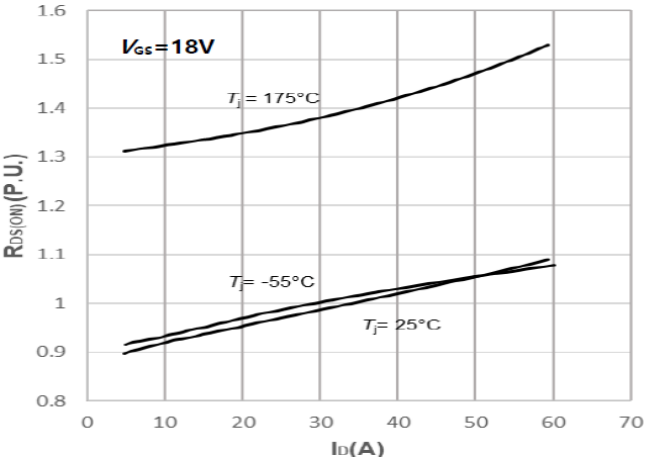


Fig 6. Rds(on) vs Drain Currentand Gate Voltage

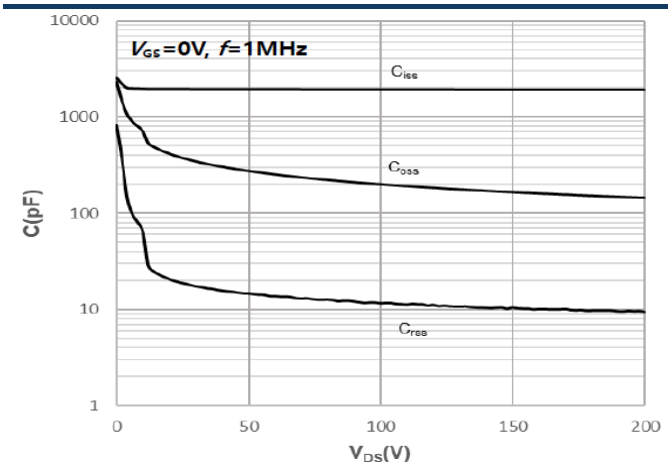


Fig 7. Capacitance Characteristics(0~200V)

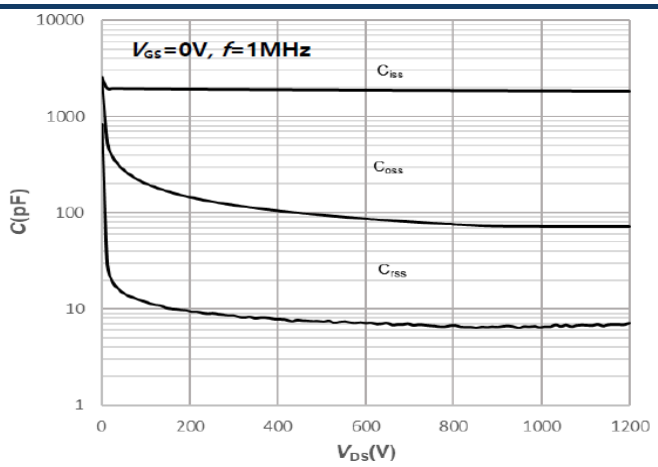


Fig 8. Capacitance Characteristics(0~1200V)

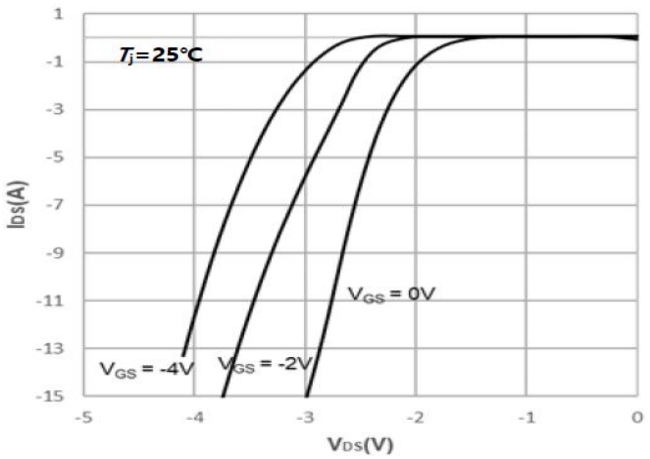


Fig 9. Body Diode Characteristics

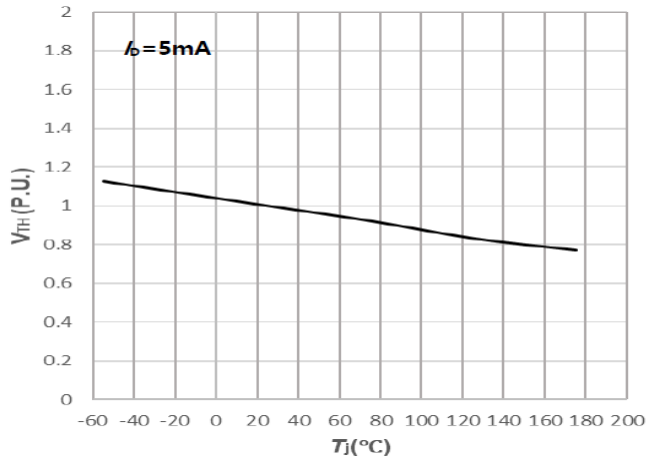
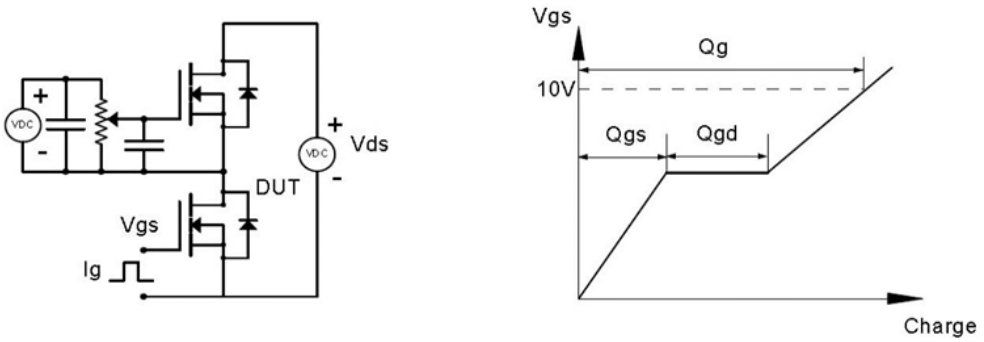
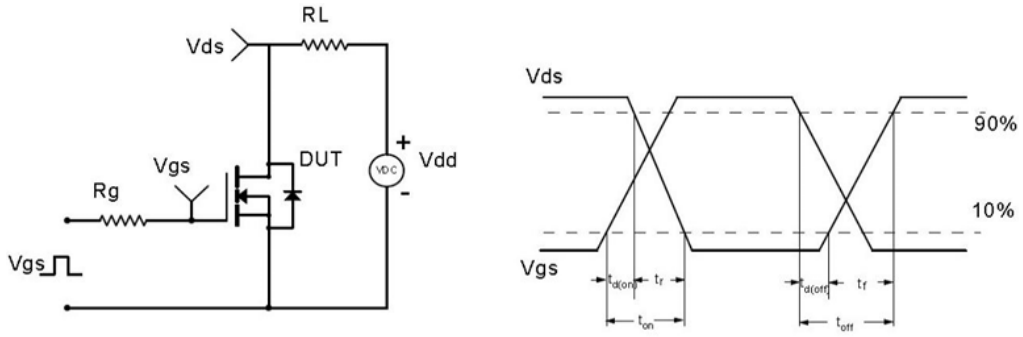


Fig 10. Threshold Voltage vs. Temperature

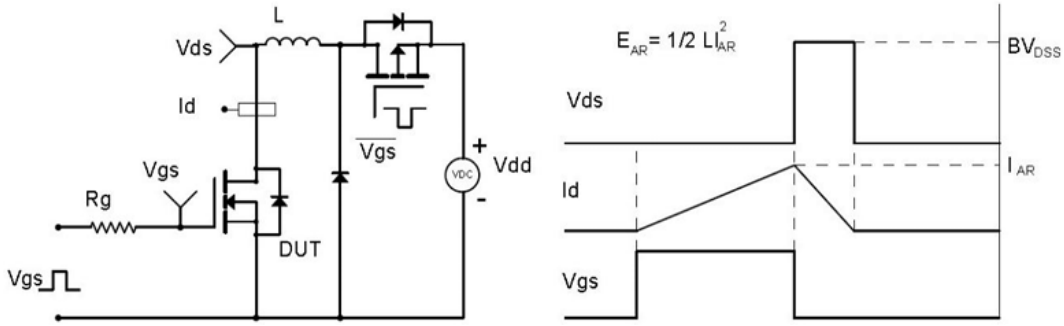
Test Circuit & Waveform



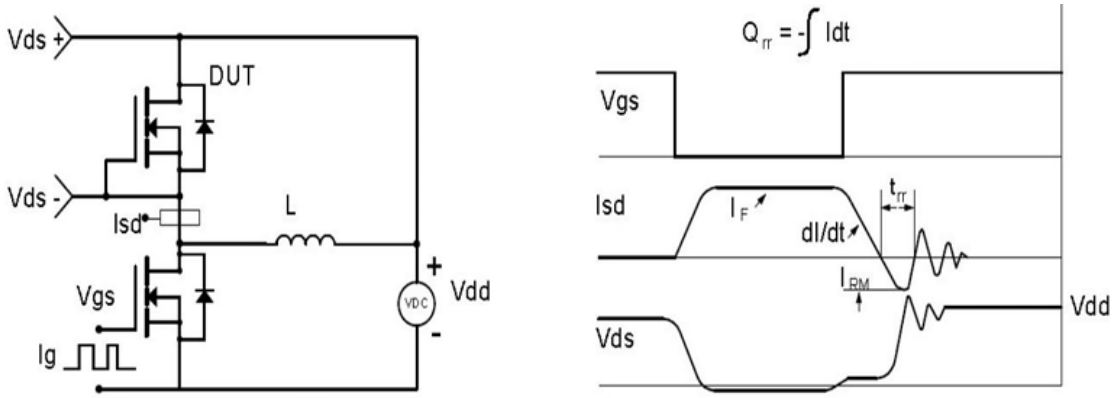
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

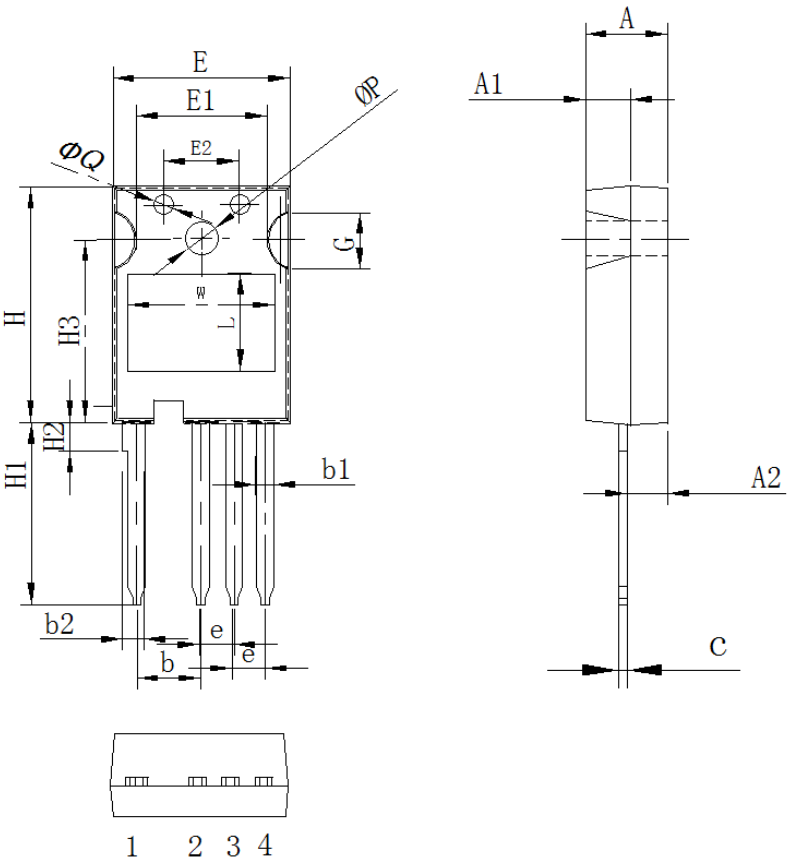


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

Package Information



Symbol	单位 mm		
	Min	Nom	Max
A	4.8	5.00	5.20
A1	2.8	3.0	3.2
A2	2.20	2.40	2.60
b	4.85	5.05	5.25
b1	1.15	1.25	1.35
b2	2.30	2.50	2.70
c	0.50	0.60	0.70
e	2.35	2.55	2.75
E	15.5	15.7	15.9
E1	10.5	10.7	10.9
E2	7.4	7.6	7.8
G	4.8	5.0	5.2
H	22.4	22.6	22.8
H1	17.5	18.0	18.5
H2	2.42	2.62	2.82
H3	16.17	16.37	16.57
ΦP	3.40	3.60	3.8
ΦQ	2.3	2.5	2.7
W	11.8	12	12.2
L	8.3	8.5	8.7

Notice

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