



PCM040R120T2Y

1,200V 53A 40mΩ Silicon Carbide MOSFET

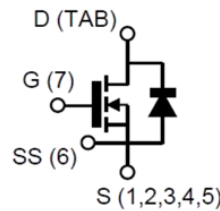
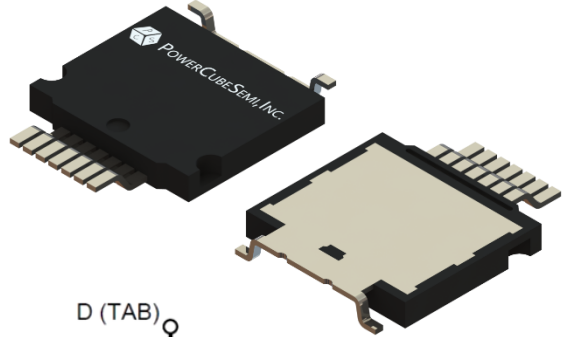
Features

- High-Speed Switching
- Essentially no switching losses
- Reduction of heat sink requirements
- Maximum working temperature at 175°C
- High blocking voltage
- Fast Intrinsic diode with low recovery current
- High-frequency operation

Applications

- Power Factor Correction, PFC
- Solar Inverters
- Uninterruptible Power Supply, UPS
- Motor Drives
- Photovoltaic Inverter
- Electric Car and Charger

Package Outline



Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	1200	V
I_D	Drain Current - Continuous ($T_j = 25^\circ\text{C}$)	53	A
	- Continuous ($T_j = 110^\circ\text{C}$)	36	A
I_{DM}	Drain Current - Pulsed	349	A
$V_{GSS\ Max}$	Gate-Source Voltage	-10 / 25	V
V_{GSS}	Gate-Source Voltage (Recommended operational)	-5 / 20	V
E_{AS}	Avalanche Energy, Single Pulse	1875	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$, $T_j = 175^\circ\text{C}$)	223	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	0.67	-	$^\circ\text{C}/\text{W}$

Electrical Characteristics

Static Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	1200	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$	-	1	50	μA
		$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}, T_J = 175^\circ\text{C}$	-	10	500	
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	-	-	250	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 40\text{ mA}$	-	3.2	-	V
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS} = 20\text{ V}, I_D = 30\text{ A}$	-	40	52	m Ω
		$V_{GS} = 20\text{ V}, I_D = 30\text{ A}, T_J = 175^\circ\text{C}$	-	72	-	
g_f	Transconductance	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$	-	12	-	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	$V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{AC} = 25\text{ mV}$	-	3682	-	pF
C_{oss}	Output Capacitance		-	149	-	
C_{rss}	Reverse Transfer Capacitance		-	26	-	

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 800\text{ V}, V_{GS} = -4 / 20\text{ V}, I_D = 30\text{ A}, R_L = 27\ \Omega, R_G = 2.7\ \Omega$	-	26	-	ns
t_r	Turn-On Rise Time		-	50	-	
$t_{d(off)}$	Turn-Off Delay Time		-	7	-	
t_f	Turn-Off Fall Time		-	11	-	
E_{on}	Turn-On Switching loss	$V_{DD} = 800\text{ V}, V_{GS} = 0 / 20\text{ V}, I_D = 30\text{ A}, R_G = 2.7\ \Omega$	-	125	-	μJ
E_{off}	Turn-Off Switching loss		-	191	-	
Q_g	Total Gate Charge	$V_{DS} = 800\text{ V}, I_D = 30\text{ A}, V_{GS} = -5 / 20\text{ V}$	-	229	-	nC
Q_{gs}	Gate-Source Charge		-	68	-	
Q_{gd}	Gate-Drain Charge		-	66	-	
R_G	Internal Gate Resistance	$V_{AC} = 25\text{ mV}, f = 1\text{ MHz}$	-	0.9	-	Ω

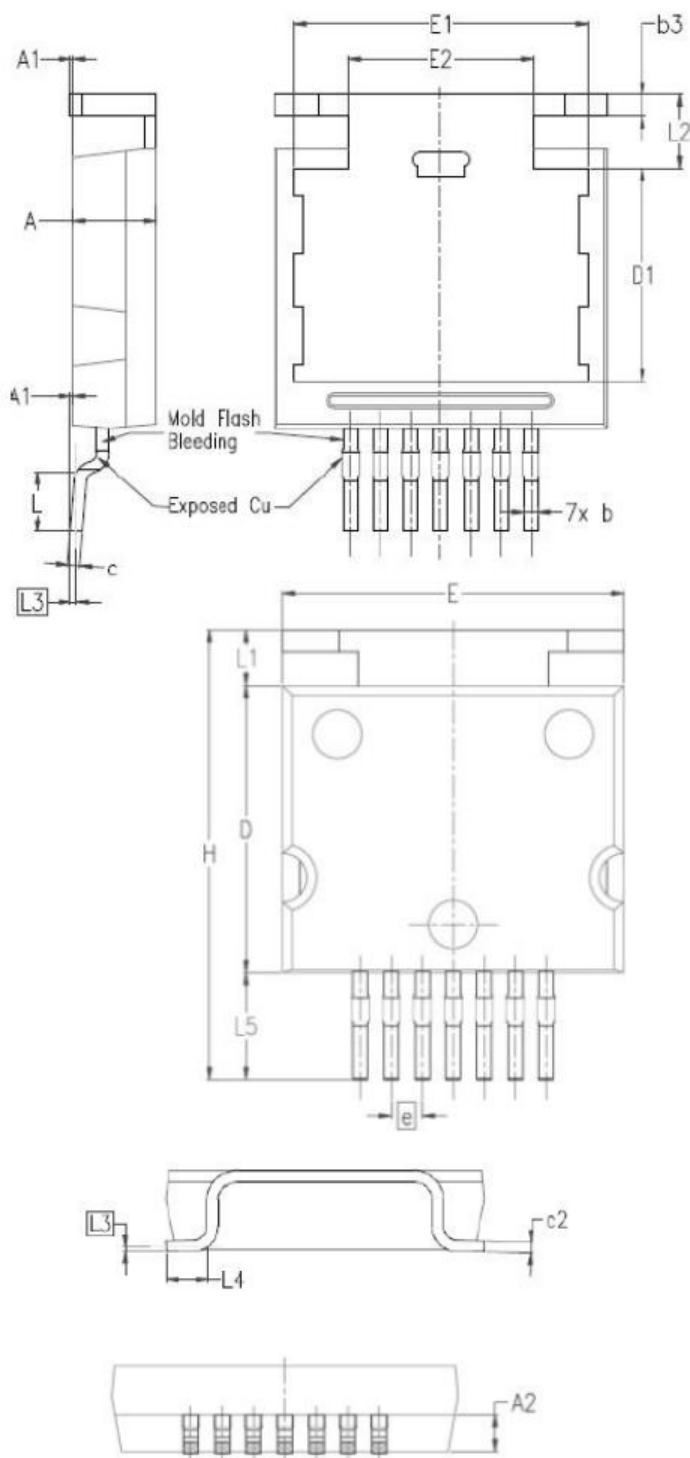
Body Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_S	Maximum Continuous Diode Forward Current	$V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	31	-	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 7.5\text{ A}$	-	3.0	-	V
t_{rr}	Reverse Recovery Time	$V_R = 400\text{ V}, V_{GS} = 0\text{ V}, I_{SD} = 30\text{ A}, di/dt = 300\text{ A/us}$	-	59	-	ns
Q_{rr}	Reverse Recovery Charge		-	212	-	nC
I_{rr}	Reverse Recovery Current		-	5.1	-	A

Package Information

Package Outline

Unit : mm



SYMBOL	DIMENSIONS		
	MIN	NOM	MAX
A	3.30	3.50	3.70
A1	-	0.10	0.25
A2	1.30	1.50	1.70
b	0.50	0.60	0.70
b3	0.80	0.90	1.00
c	0.40	0.50	0.60
c2	0.40	0.50	0.60
D	11.70	11.80	11.90
D1	8.80	9.00	9.20
E	13.60	14.00	14.40
E1	12.00	12.40	12.80
E2	7.60	7.80	8.00
e	1.27 BSC		
H	17.70	18.50	19.30
L	1.90	2.50	3.10
L1	2.30 REF		
L2	2.85	3.10	3.35
L3	0.25 BSC		
L4	1.25	1.85	2.45
L5	4.40 REF		