CC1720354L

SiC Power MOSFETs

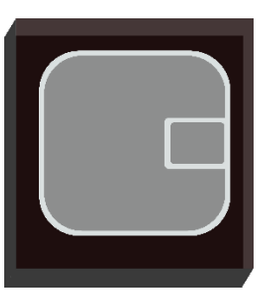
CoolCAD Power MOSFETs exceed power, efficiency and portability capabilities of standard silicon devices and are available in a variety of breakdown voltages (650V, 1200V, 1700V & 3300V) and current ratings. They have low on-resistance and low leakage in the blocking state. Fabricated on high-quality SiC epitaxial layers, our proprietary fabrication process includes carefully chosen annealing procedures to ensure a high-quality SiC-SiO_2 gate oxide dielectric layer. Doping profile, neck region, and edge termination ensure extremely low R_{on} and high breakdown voltage.

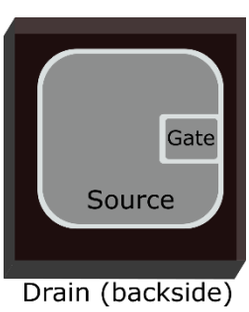
BENEFITS

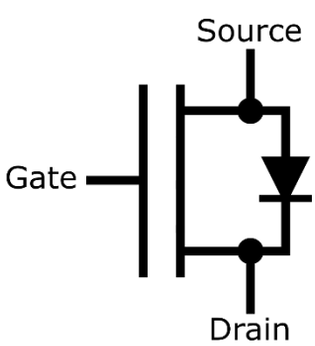
- Higher efficiency
- Reduced cooling
- Increased power
- Reduced system volume

APPLICATIONS INCLUDE

Electromechanical power converters, DC to DC, AC to DC and DC to AC converters, switching power supplies, electric vehicles, hybrid vehicles, solar and wind energy power converters.







Part Number	Package	Marking
CC1720354L	N/A	CoolCADElectronics

sales@coolcadelectronics.com Greenbelt, Maryland https://coolcadelectronics.com

Maximum Ratings

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
DC blocking voltage	V_{DSmax}	T_J=25°C to 175°C	1700			V
Gate input voltage range	V_{GS}	Recommended range Dynamic	-5 -7		20 22	V
Avalanche rating	V_{AVA}	V_{GS}=0V; I_{DS}=1mA; T_J=25°C V_{GS}=0V; I_{DS}=1mA; T_J=175°C	1700	>2000		V

Electrical and Thermal Characteristics

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Gate threshold voltage	V_{TH}	V_{DS}=1V; I_{DS}=40mA; T_J=25°C V_{DS}=1V; I_{DS}=40mA; T_J=175°C	2.63	2.78 1.44	2.93	V
Gate leakage	I_{GSS}	V_{GS}=20V; V_{DS}=0; T_J=25°C V_{GS}=20V; V_{DS}=0; T_J=175°C		40 300		pA
Drain leakage	I_{DSS}	V_{DS}=1000V; V_{GS}=0; T_J=25°C V_{DS}=1000V; V_{GS}=0; T_J=175°C		0.008 1.2		μA
Drain-source on-resistance	R_{DSON}	V_{GS}=20V; I_{DS}=40A; T_J=25°C V_{GS}=20V; I_{DS}=40A; T_J=175°C V_{GS}=20V; I_{DS}=50A; T_J=25°C V_{GS}=20V; I_{DS}=50A; T_J=175°C	17.5	20 72.5 21.5 77.5	22.5	mΩ
Transconductance	G_m	V_{DS}=10V; I_{DS}=40A; T_J=25°C V_{DS}=10V; I_{DS}=30A; T_J=25°C V_{DS}=10V; I_{DS}=30A; T_J=175°C		32 27 25		S
Input capacitance	C_{ISS}	V_{GS}=0V; V_{DS}=200 / 1000V f=1MHz; T_J=25°C		3600 / 3500		pF
Output capacitance	C_{OSS}			270 / 120		
Reverse transfer capacitance	C_{RSS}			38 / 22		
Stored energy at output	E_{OSS}	Double integral of C_{OSS} (up to 1000V)		156		μJ
Turn on switching energy (with body diode)	E_{ON}	V_{GS}=-4/19V; V_{DD}=800V; $R_{G(ext)}$=0Ω I_{DS}=30A; L=180μH; T_J=25°C		1040		
Turn off switching energy (with body diode)	E_{OFF}	Clamped inductive switching waveform test circuit. Figure 2.		460		
Rise time	t_r	V_{GS}=-4/19V; V_{DD}=800V; $R_{G(ext)}$=0Ω I_{DS}=30A; L=180μH; T_J=25°C Clamped inductive switching waveform test circuit. Figure 2.		65		ns
Fall time	t_f			20		
Turn off delay time	$t_{d(on)}$ $t_{d(off)}$	Relative to V_{DS} inductive load. Figure 2.		1 50		
Gate Charge	Q_G	V_{GS}=-4/19V; V_{DD}=800V; $R_{G(ext)}$=500Ω I_{DS}=16A; R_L=50Ω ; I_{GS}=38mA; T_J=25°C Figure 3.		300		nC
Internal gate resistance	R_G	f=1Mz; V_{AC}=25mV; T_J=25°C Open drain		5		Ω
Thermal resistance:Junction to Case	R_{JC}			N/A		°C/W

sales@coolcadelectronics.com Greenbelt, Maryland https://coolcadelectronics.com

Body diode characteristics

*Characteristics	Symbol	Comments	Min	Typ	Max	Units
Diode forward voltage	V_F	I_F=10A; V_{GS}=0V; T_J=25°C I_F=10A; V_{GS}=0V; T_J=175°C I_F=20A; V_{GS}=−4V; T_J=25°C I_F=20A; V_{GS}=−4V; T_J=175°C		2.57 2.28 3.76 3.09		V
Pulsed diode current	$I_{s(pulsed)}$	V_{GS}=0V; V_{DS}=−3V; T_J=25°C V_{GS}=0V; V_{DS}=−3V; T_J=175°C		20 22		A
Reverse recovery time	t_{rr}	V_{DD}=800V; V_{GS}=−4V; I_{DS}=50A $R_{G(ext)}$=0Ω L=180µH di/dt=840A/µs Clamped inductive switching waveform test circuit. Figure 2.		55		ns
Reverse recovery charge	Q_{rr}			480		nC
Peak reverse recovery current	I_{RRM}			27		A

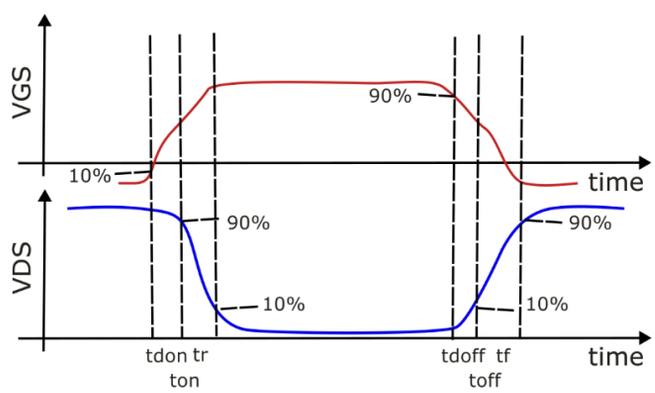


Figure 1: Timing references.

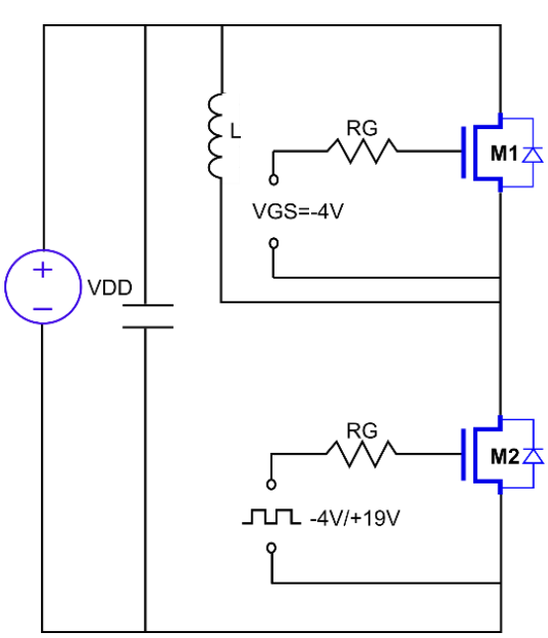


Figure 2: Clamped inductive switching waveform test circuit.

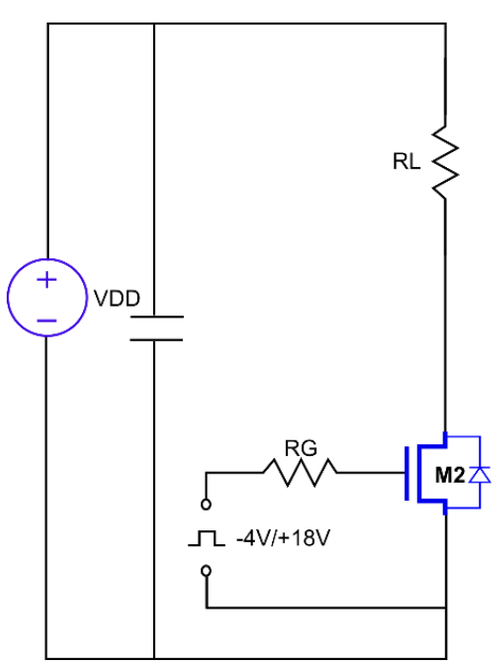
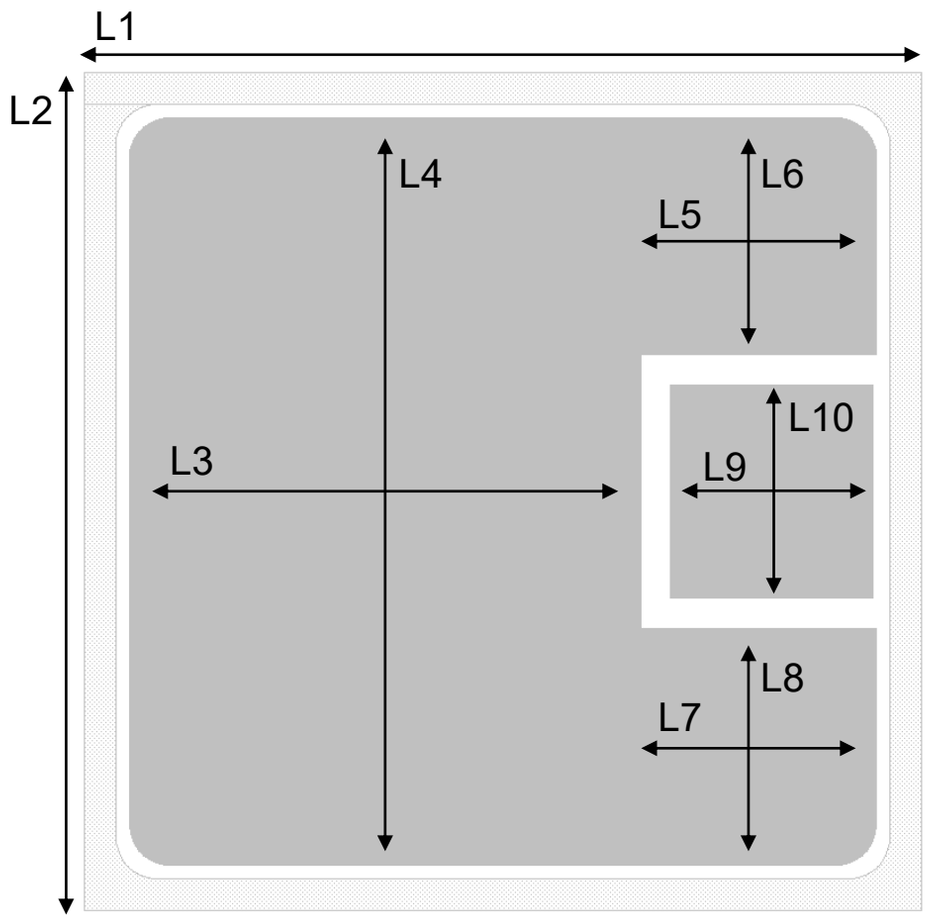


Figure 3: Gate charge test circuit.



Die dimensions

Parameter	Dimensions	Units
Die size (including dicing streets)	L1×L2 ~ 5.8×5.8	mm
Exposed source pad 1	L3×L4 ~ 3.84×5.38	mm
Exposed source pad 2	L5×L6 ~ 1.47×1.82	mm
Exposed source pad 2	L7 ~ L5 and L8 ~ L6	
Gate pad	L9×L10 ~ 1.4×1.4	mm
Chip thickness	360±10	µm
Source metallization (Al)	4	µm
Gate metallization (Al)	4	µm
Drain metallization (Ti/Ni/Ag - annealed)	0.4 (Ag)	µm
Dicing street width	80	µm

CAUTION: These devices are ESD sensitive. Use proper handling procedures.

Disclaimer: These specifications may not be considered as a guarantee of components characteristics. Components have to be tested depending on intended application as adjustments may be necessary. The use of CoolCAD Electronics components in life support appliances and systems are subject to written approval of CoolCAD Electronics.

CoolCAD Electronics reserves the right to change without notice the specifications and information contained within.

sales@coolcadelectronics.com Greenbelt, Maryland https://coolcadelectronics.com