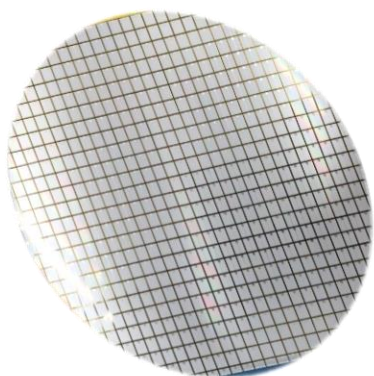


PRELIMINARY DATASHEET

SCS0015C140m23

M23 SiC power MOSFET, 5.7 mm x 5.0 mm



$V_{DSS} = 1400\text{ V}$

$R_{DS(on)} = 15\text{ m}\Omega$

- positive temperature coefficient
- easy paralleling

Maximum ratings¹

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Drain-source voltage	V_{DSmax}	$V_{GS} = 0\text{ V}$, $T_{vj} \geq 25^\circ\text{C}$		1400	V
Continuous DC drain current	I_D	$V_{GS} = 18\text{ V}$, $T_{vj} = 25^\circ\text{C}$		100	A
Peak drain current	I_{DM}	Pulse width t_p limited by T_{jmax}		200	A
Gate-source voltage (DC)	V_{GSS}		-8	22	V
Gate-source surge voltage	$V_{GS\text{ surge}}$	$t_p \leq 300\text{ ns}$, $D < 1\%$	-10	25	V
DC reverse drain current	I_S	$V_{GS} = -5\text{ V}$, $T_c = 25^\circ\text{C}$,			A
Peak reverse drain current	I_{SM}	$V_{GS} = 0\text{ V}$, limited by T_{jmax}		200	A
Junction operating temperature	$T_{vj(op)}$		-55	175	$^\circ\text{C}$



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¹ Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747-8



MOSFET²

Recommended values

PARAMETER	SYMBOL	CONDITIONS	VALUE	UNIT
Gate-source turn-on voltage	$V_{GS(on)}$		18	V
Gate-source turn-off voltage	$V_{GS(off)}$		-5	V

Characteristic values

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Drain-source breakdown voltage –	$V_{(BR)DSS}$	$V_{GS} \leq 0$ V, $I_D = 250$ μ A, $T_{vj} = 25^\circ\text{C}$	1400			V
Drain-source on-state resistance ³ –	$R_{DS(on)}$	$I_D = 100$ A, $V_{GS} = 18$ V		15		$m\Omega$
		$T_{vj} = 175^\circ\text{C}$		31		$m\Omega$
Drain leakage current	I_{DSS}	$V_{DS} = 1200$ V, $V_{GS} = 0$ V		1	50	μ A
		$T_{vj} = 175^\circ\text{C}$		10		μ A
Gate leakage current	I_{GSS}	$V_{GS} = +22 / -10$ V, $V_{DS} = 0$ V, $T_{vj} = 25^\circ\text{C}$	-50		50	nA
Gate-source threshold voltage –	$V_{GS(th)}$	$I_D = 5$ mA, $V_{DS} = V_{GS}$	2.25	2.75	3.5	V
		$T_{vj} = 175^\circ\text{C}$		1.9		V
Transconductance	g_{fs}	$V_{DS}=20$ V, $I_D=100$ A, $T_j=25^\circ\text{C}$		80		S
		$V_{DS}=20$ V, $I_D=100$ A, $T_j=175^\circ\text{C}$		58		S
Input capacitance	C_{iss}	$V_{DS} = 960$ V, $V_{GS} = 0$ V, $f = 100$ kHz, $V_{AC} = 25$ mV, $T_{vj} = 25^\circ\text{C}$		5.1		nF
Output capacitance	C_{oss}			270		pF
Reverse transfer capacitance	C_{rss}			21		pF
Internal gate resistor	R_{Gint}			2.5		Ω
Total gate charge	Q_G	$I_D = 100$ A, $V_{DS} = 800$ V, $V_{GS} = -5$ V ... 18 V		205		nC
Gate to source charge	Q_{GS}	$I_D = 100$ A, $V_{DS} = 800$ V, $V_{GS} = -5$ V ... 18 V		60		nC
Gate to drain charge	Q_{GD}	$I_D = 100$ A, $V_{DS} = 800$ V, $V_{GS} = -5$ V ... 18 V		150		nC

² Characteristic values according to IEC 60747-8

³ Given at chip level



Characteristic values (continued)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 960 \text{ V}$, $I_D = 100 \text{ A}$, $R_G = 5 \Omega$, $V_{GS} = -5 / +18 \text{ V}$, $L_S = 35 \text{ nH}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	24		ns
			$T_{vj} = 175 \text{ }^\circ\text{C}$	18		ns
Rise time	t_r		$T_{vj} = 25 \text{ }^\circ\text{C}$	33		ns
			$T_{vj} = 175 \text{ }^\circ\text{C}$	25		ns
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 960 \text{ V}$, $I_D = 100 \text{ A}$, $R_G = 5 \Omega$, $V_{GS} = -5 / +18 \text{ V}$, $L_S = 35 \text{ nH}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	75		ns
			$T_{vj} = 175 \text{ }^\circ\text{C}$	90		ns
Fall time	t_f		$T_{vj} = 25 \text{ }^\circ\text{C}$	50		ns
			$T_{vj} = 175 \text{ }^\circ\text{C}$	55		ns
Turn-on switching energy	E_{on}	$V_{CC} = 960 \text{ V}$, $I_D = 100 \text{ A}$, $R_G = 5 \Omega$, $V_{GS} = -5 / +18 \text{ V}$, $dI/dt = 3200 \text{ A}/\mu\text{s}$ (175°C), $L_S = 35 \text{ nH}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	6100		μJ
			$T_{vj} = 175 \text{ }^\circ\text{C}$	6600		μJ
Turn-off switching energy	E_{off}	$V_{CC} = 960 \text{ V}$, $I_D = 100 \text{ A}$, $R_G = 5 \Omega$, $V_{GS} = -5 / +18 \text{ V}$, $dV/dt = 21000 \text{ V}/\mu\text{s}$ (175°C), $L_S = 35 \text{ nH}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	1500		μJ
			$T_{vj} = 175 \text{ }^\circ\text{C}$	2000		μJ
Short circuit current	I_{SC}	$t_{pCS} \leq 1.5 \mu\text{s}$, $V_{GS} = 18 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$, $V_{CC} = 960 \text{ V}$, $V_{DSS \text{ Chip}} \leq 1200 \text{ V}$		tbd		A

Body Diode (MOSFET)⁴

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Drain-source reverse voltage ⁵	V_{SD}	$V_{GS} = -5 \text{ V}$, $I_S = 100 \text{ A}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	5.4		V
			$T_{vj} = 175 \text{ }^\circ\text{C}$	4.8		V
MOSFET peak forward recovery current	I_{frm}	$V_{DS} = 960 \text{ V}$, $I_S = 100 \text{ A}$, $dI/dt = 3200 \text{ A}/\mu\text{s}$ (175°C), $R_G = 5 \Omega$, $V_{GS} = -5 / +18 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	20		A
			$T_{vj} = 175 \text{ }^\circ\text{C}$	31		A
MOSFET forward recovery charge	Q_f		$T_{vj} = 25 \text{ }^\circ\text{C}$	0.5		μC
			$T_{vj} = 175 \text{ }^\circ\text{C}$	1.3		μC
MOSFET forward recovery time	t_{fr}		$T_{vj} = 25 \text{ }^\circ\text{C}$	80		ns
			$T_{vj} = 175 \text{ }^\circ\text{C}$	70		ns
MOSFET forward recovery energy	E_{fr}		$T_{vj} = 25 \text{ }^\circ\text{C}$	500		μJ
			$T_{vj} = 175 \text{ }^\circ\text{C}$	550		μJ

⁴ Characteristic values according to IEC 60747-8

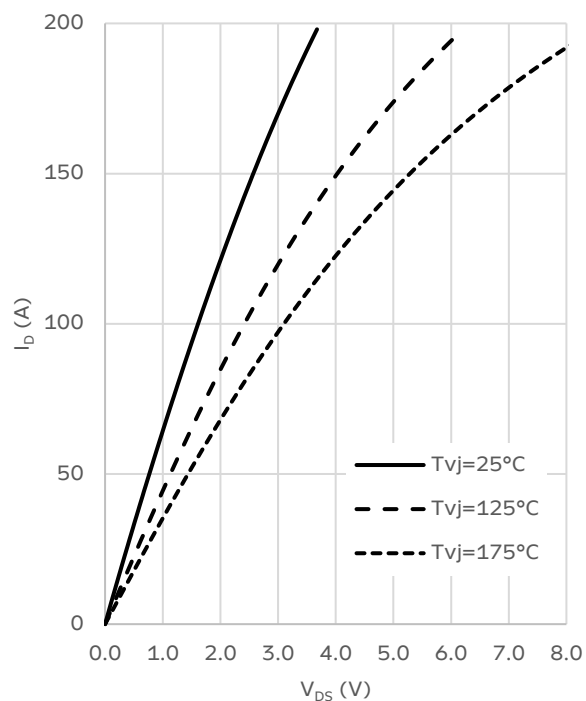
⁵ Given at chip level



Characteristics

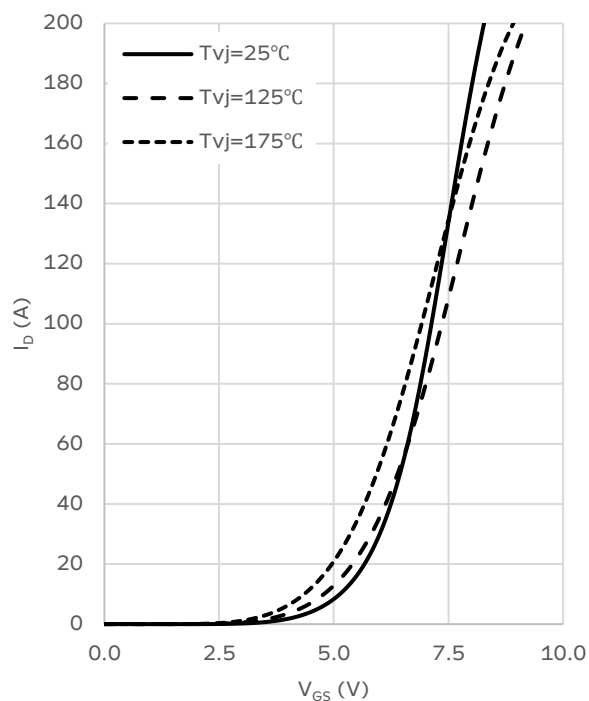
MOSFET on-state characteristics (typical)

$$I_D = f(V_{DS})$$
$$V_{GS} = 18 \text{ V}$$



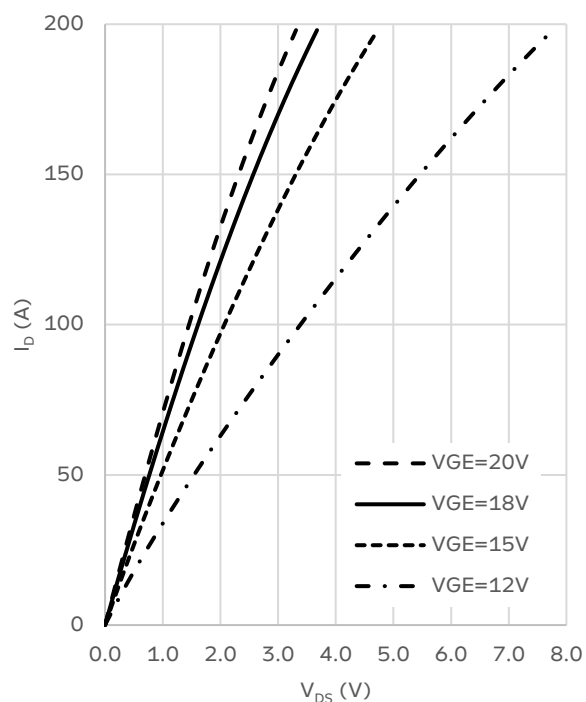
MOSFET transfer characteristics (typical)

$$I_D = f(V_{GS})$$
$$V_{DS} = 20 \text{ V}$$



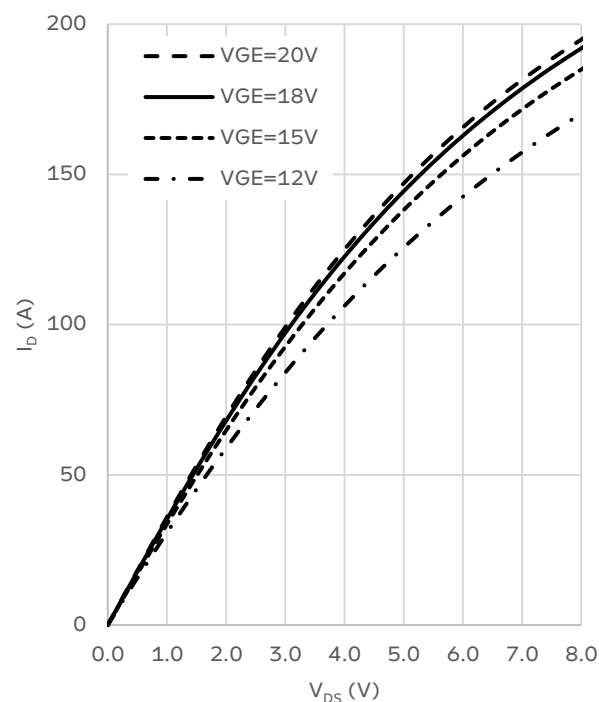
MOSFET output characteristics (typical)

$$I_D = f(V_{DS})$$
$$T_{vj} = 25^\circ\text{C}$$



MOSFET output characteristics (typical)

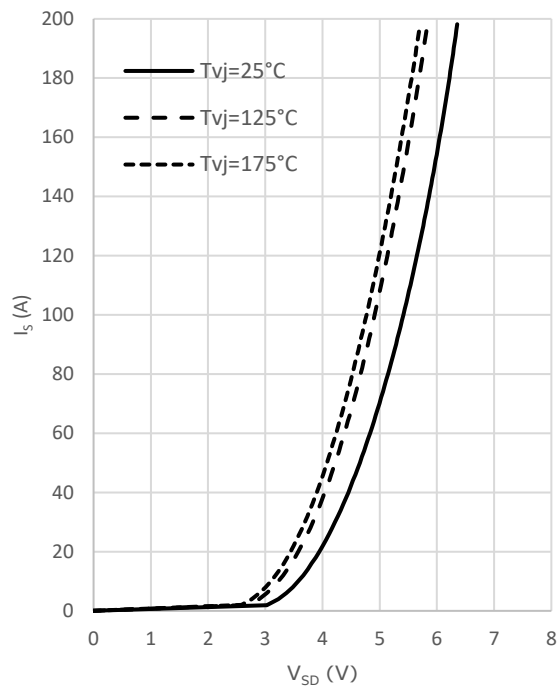
$$I_D = f(V_{DS})$$
$$T_{vj} = 175^\circ\text{C}$$





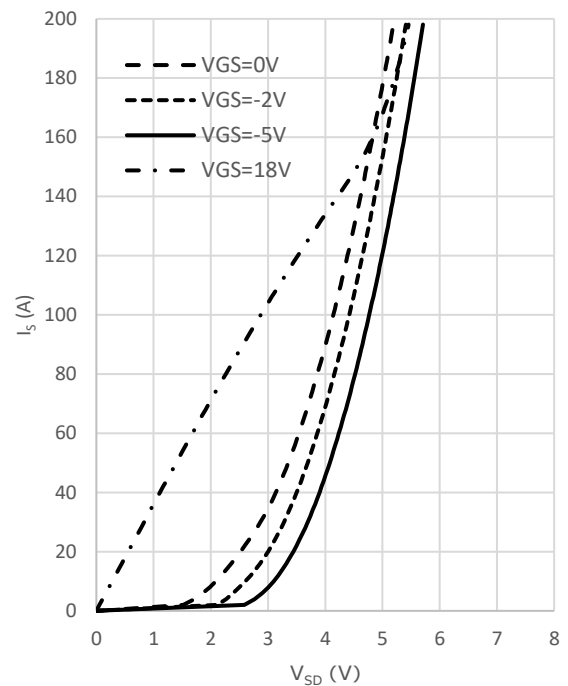
Body diode characteristic (typical)

$I_S = f(V_{SD})$
 $V_{GS} = -5 \text{ V}$



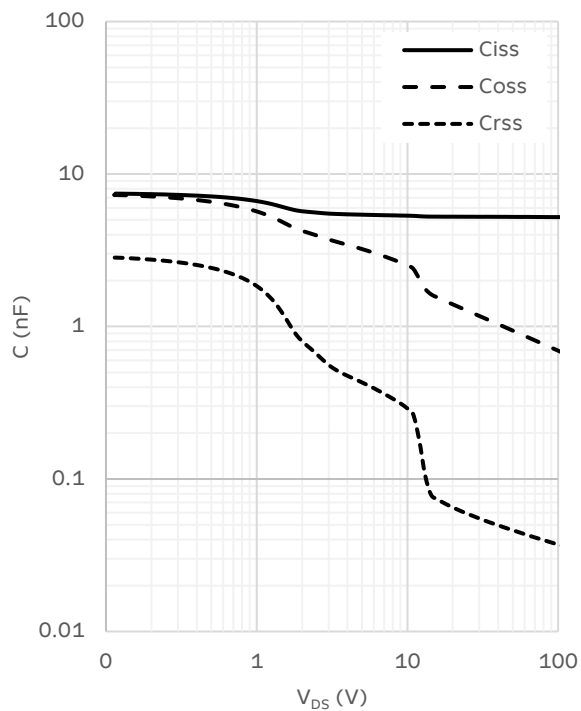
Body diode characteristic (typical)

$I_S = f(V_{SD})$
 $T_{vj} = 175 \text{ °C}$



Capacitance characteristics (typical)

$C = f(V_{DS}), T_{vj} = 25 \text{ °C}$
 $f = 100 \text{ kHz}, V_{GS} = 0 \text{ V}$

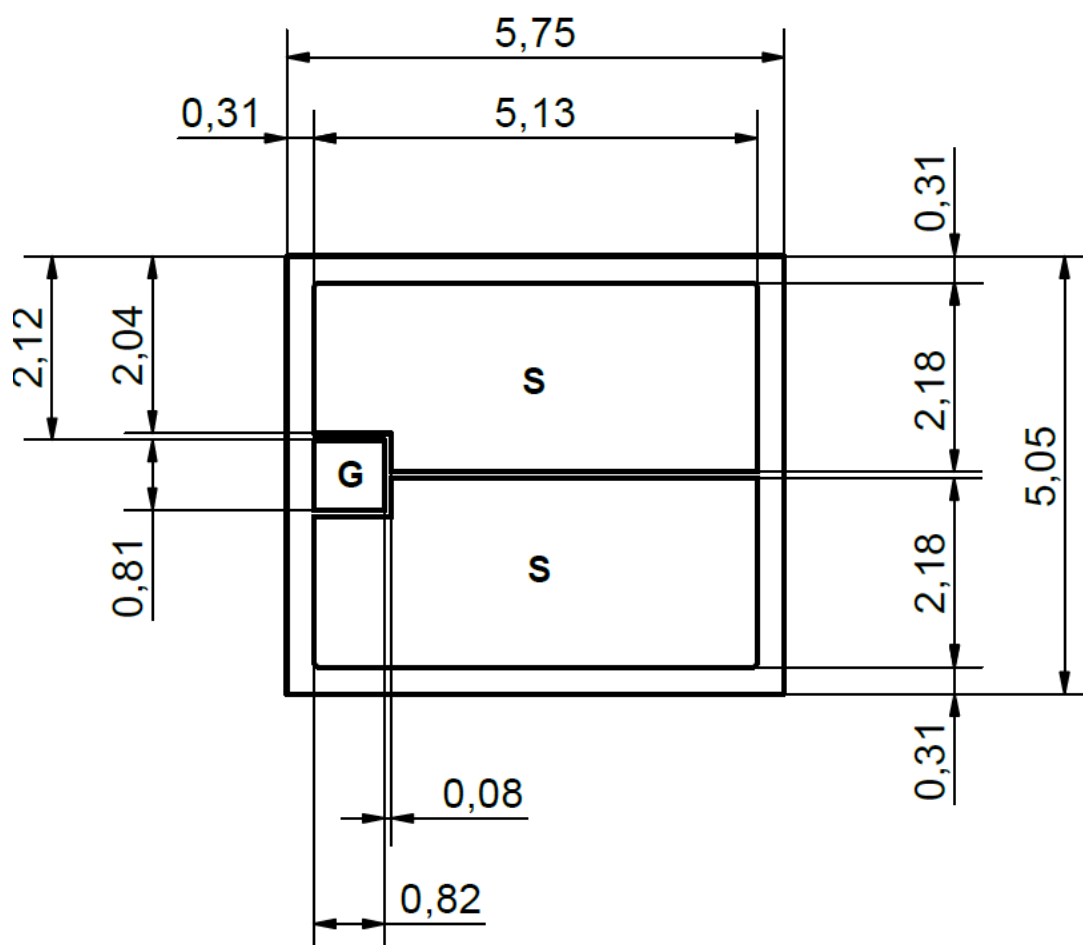




Mechanical properties⁶

PARAMETER		UNIT
Die size	$(5.75 \pm 0.01) \times (5.05 \pm 0.01)$	mm ²
Gate pad size	0.81 x 0.82	mm ²
Thickness	180 ± 5	µm
Wafer diameter	150	mm
Maximum chips per wafer	470	pcs
Frontside passivation	Polyimide	
Frontside metal (pads)	AlCu, 4000	nm
Backside metal	Ti:Ni:Ag, 100:400:1000	nm

Chip drawing



This is an electrostatic sensitive device.

Ordering Information

OPTION		ARTICLE NUMBER
Frontside metal (gate and source pads)	AlCu (_F00)	SCS0015C140m23_F00
	Cu (_F04)	SCS0015C140m23_F04
Packaging Method	Sawn on tape (_O10)	SCS0015C140m23_XXX_O10
	Wafer unsawn (_O20)	SCS0015C140m23_XXX_O20
	Waffle pack (_O30)	SCS0015C140m23_XXX_O30