

General Description

The Super-Si²C™ MOSFET utilizes Oriental-Semi's patented technology to achieve outstanding low on-resistance, lower gate charge, and extremely low Q_{rr}, by using wide band gap (WBG) material. It is engineered to minimize conduction loss, provide superior switching performance. The Super-Si²C MOSFET is a novel SiC-related MOSFET device which provides high reliability and extremely high efficiency. It is targeted to meet the most aggressive efficiency standards of power supply systems by pushing both performance and power density to extreme limits.

Features

- Low R_{DS(ON)} & FOM
- Extremely low reverse recovery charges
- Extremely low switching loss
- Excellent stability and uniformity




Applications

- PV inverter
- On board charger
- Server power supply
- Motor driving system for HEV and EV

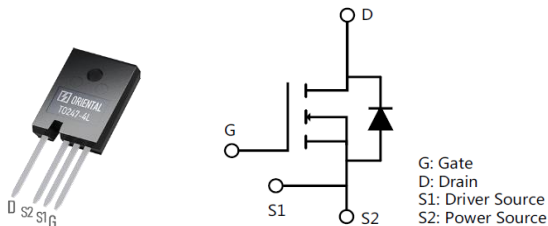
Key Performance Parameters

Parameter	Value	Unit
V _{DS}	650	V
I _D , pulse	97	A
R _{DS(ON)} , typ @ V _{GS} =18V	60	mΩ
Q _g	135	nC

Marking Information

Product Name	Package	Marking
OSS65R060H4T2F	TO247-4L	OSS65R060H4T2

Package & Pin Information



Absolute Maximum Ratings at T_j=25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	650	V
Gate-source voltage	V _{GS}	±30	V
Continuous drain current ¹⁾ , T _C =25 °C	I _D	39	A
Continuous drain current ¹⁾ , T _C =100 °C		27	
Pulsed drain current ²⁾ , T _C =25 °C	I _{D, pulse}	97	A
Power dissipation ³⁾ , T _C =25 °C	P _D	535	W
MOSFET dv/dt ruggedness, V _{DS} =0...480 V	dv/dt	50	V/ns
Reverse diode dv/dt, V _{DS} =0...480 V, I _{SD} ≤I _D	dv/dt	50	V/ns
Operation and storage temperature	T _{stg} , T _j	-55 to 175	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	R _{θJC}	0.28	°C/W
Thermal resistance, junction-ambient	R _{θJA}	62	°C/W

Electrical Characteristics at T_j=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV _{DSS}	650			V	V _{GS} =0 V, I _D =200 μA
		700				V _{GS} =0 V, I _D =200 μA, T _j =150 °C
Gate threshold voltage	V _{GS(th)}	3.0		5.0	V	V _{DS} =V _{GS} , I _D =1 mA
Drain-source on-state resistance	R _{DS(ON)}		60	78	mΩ	V _{GS} =18 V, I _D =20 A
			88			V _{GS} =18 V, I _D =20 A, T _j =125 °C
Gate-source leakage current	I _{GSS}			100	nA	V _{GS} =30 V
				-100		V _{GS} =-30 V
Drain-source leakage current	I _{DSS}			100	μA	V _{DS} =650 V, V _{GS} =0 V
Gate resistance	R _G		2.6		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		4261		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		383		pF	
Reverse transfer capacitance	C_{rss}		8.5		pF	
Effective output capacitance, energy related	$C_{o(er)}$		220		pF	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}-400\text{ V}$
Effective output capacitance, time related	$C_{o(tr)}$		770		pF	
Turn-on delay time	$t_{d(on)}$		18		ns	$V_{GS}=18\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=40\text{ A}$
Rise time	t_r		54		ns	
Turn-off delay time	$t_{d(off)}$		32		ns	
Fall time	t_f		40		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		135		nC	$V_{GS}=18\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=40\text{ A}$
Gate-source charge	Q_{gs}		70.8		nC	
Gate-drain charge	Q_{gd}		36.6		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}		2.2		V	$I_S=27\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		37		ns	$V_R=400\text{ V}$, $I_S=40\text{ A}$, $di/dt=1000\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		398		nC	
Peak reverse recovery current	I_{rrm}		21		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.

Electrical Characteristics Diagrams

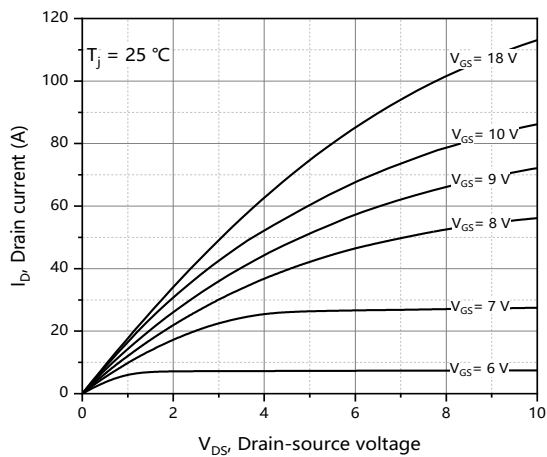


Figure 1. Typ. output characteristics

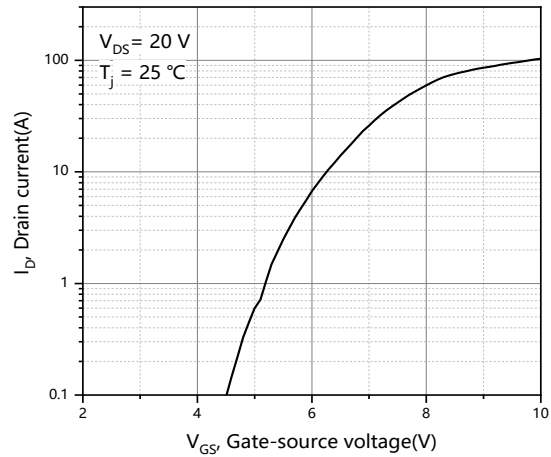


Figure 2. Typ. transfer characteristics

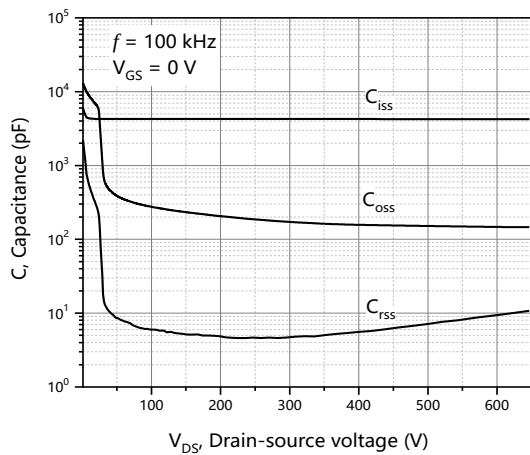


Figure 3. Typ. capacitances

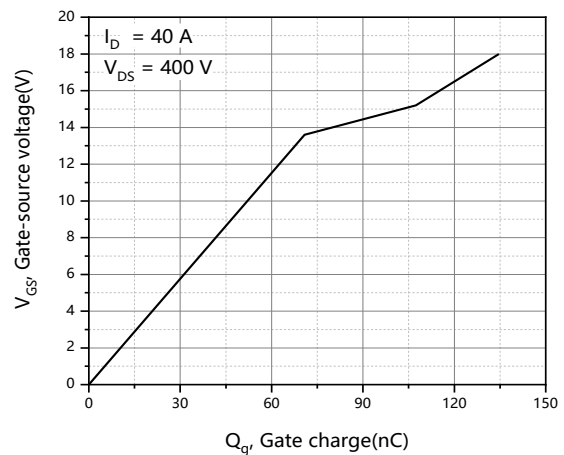


Figure 4. Typ. gate charge

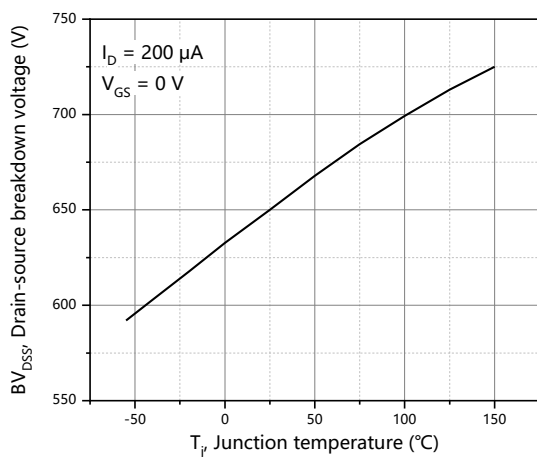


Figure 5. Drain-source breakdown voltage

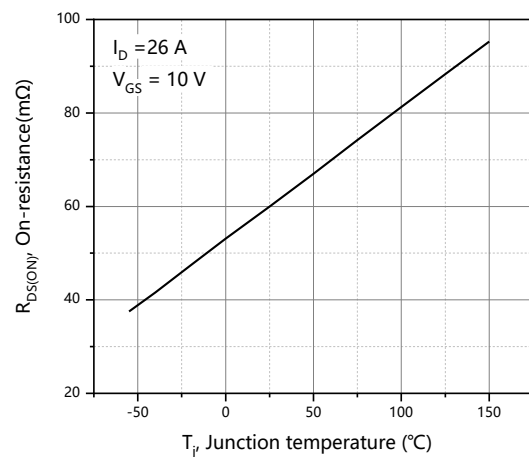


Figure 6. Drain-source on-state resistance

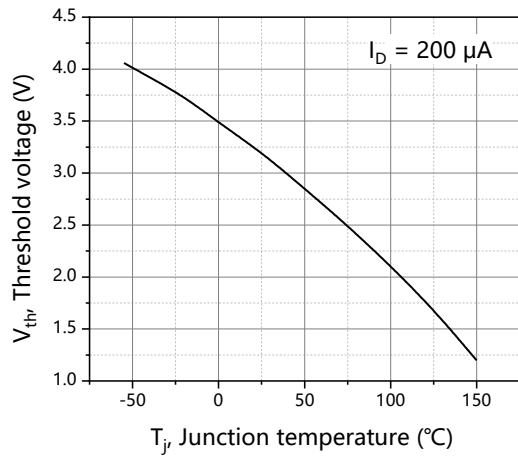


Figure 7. Threshold voltage

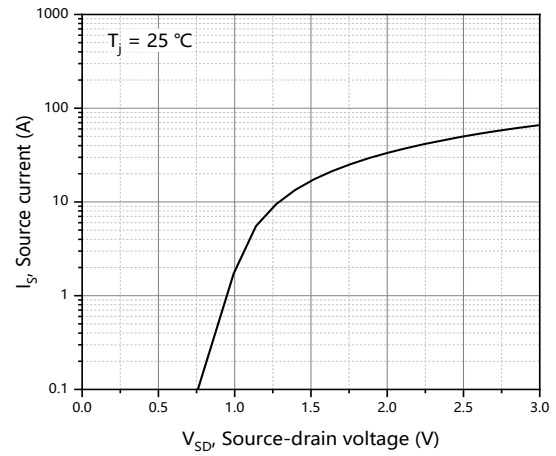


Figure 8. Forward characteristic of body diode

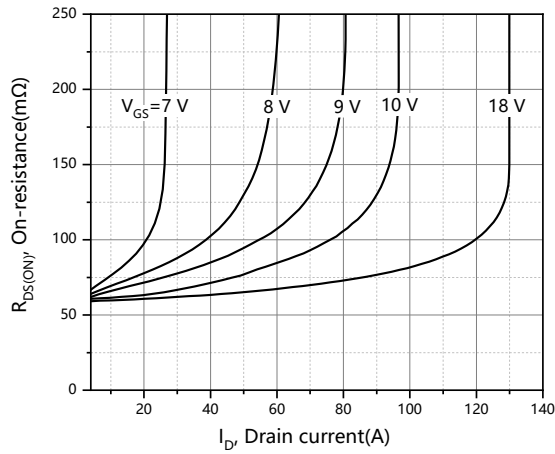


Figure 9. Drain-source on-state resistance

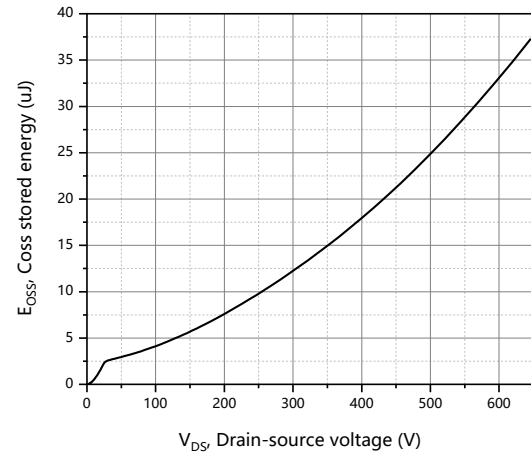


Figure 10. Typ. Coss stored energy

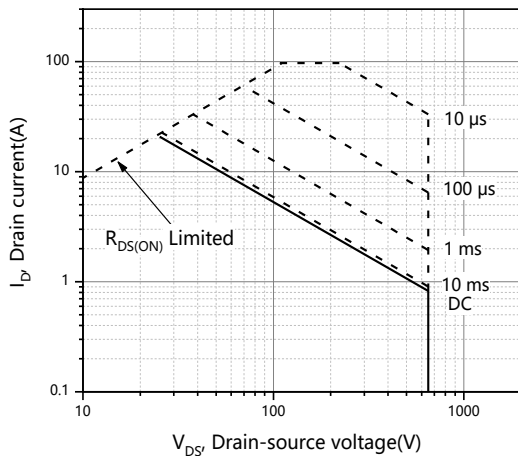


Figure 11. Safe operation area T_c=25 °C

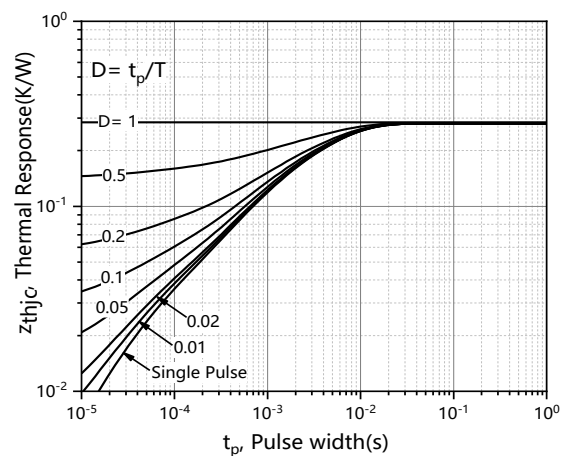


Figure 12. Max. transient thermal impedance

Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

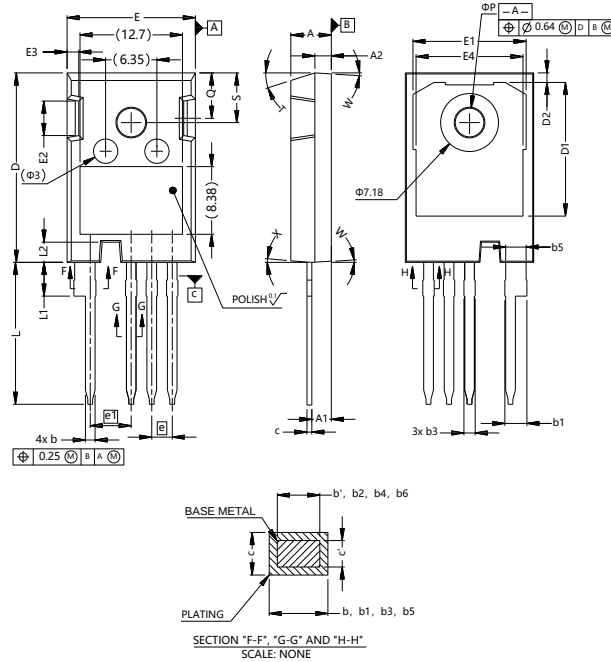


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm	
	Min	Max
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
ΦP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF	
W	3.5° REF	
X	4° REF	

Version 1: TO247-4L-S package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO247-4L-S	30	15	450	4	1800

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSS65R060H4T2F	TO247-4L	yes	yes	yes

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