General Description

The Super-Si²C™ MOSFET utilizes Oriental-Semi's patented technology to achieve outstanding low on-resistance, lower gate charge, and extremely low Qrr, 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

GreenMOS®

RoHS compliant

- 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

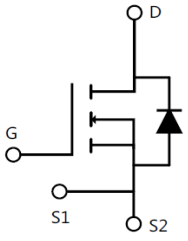
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	700	V
$I_{D,\ pulse}$	154	A
$R_{DS(ON),\ typ}$ @ V_{GS}=18V	30	mΩ
Q_g	218	nC

Marking Information

Product Name	Package	Marking
OSS65R040H4T2F	TO247-4L	OSS65R040H4T2

Package & Pin Information



G: Gate
D: Drain
S1: Driver Source
S2: Power Source

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	75	A
Continuous drain current[1], T_C=100 °C		47	
Pulsed drain current[2], T_C=25 °C	$I_{D,\ pulse}$	154	A
Power dissipation[3], T_C=25 °C	P_D	390	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 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	0.32	°C/W
Thermal resistance, junction-ambient	$R_{\theta JA}$	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
Gate threshold voltage	$V_{GS(th)}$	3		5	V	V_{DS}=V_{GS}, I_D=1 mA
Drain-source on-state resistance	$R_{DS(ON)}$		30	40	mΩ	V_{GS}=18 V, I_D=25 A
			62			V_{GS}=18 V, I_D=25 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}			10	mA	V_{DS}=650 V, V_{GS}=0 V
Gate resistance	R_G		3.1		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		6822		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		426		pF	
Reverse transfer capacitance	C_{rss}		8.6		pF	
Effective output capacitance, energy related	$C_{o(er)}$		267		pF	V_{GS}=0 V, V_{DS}=0 V-400 V
Effective output capacitance, time related	$C_{o(tr)}$		1175		pF	
Turn-on delay time	$t_{d(on)}$		21		ns	V_{GS}=18 V, V_{DS}=400 V, R_G=2 Ω, I_D=40 A
Rise time	t_r		23		ns	
Turn-off delay time	$t_{d(off)}$		51		ns	
Fall time	t_f		15		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		218		nC	V_{GS}=18 V, V_{DS}=400 V, I_D=40 A
Gate-source charge	Q_{gs}		70		nC	
Gate-drain charge	Q_{gd}		50		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			2.5	V	I_S=25 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		42		ns	V_R=400 V, I_S=40 A, di/dt=1000A/μs
Reverse recovery charge	Q_{rr}		514		nC	
Peak reverse recovery current	I_{rrm}		22.6		A	

Note

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

Electrical Characteristics Diagrams

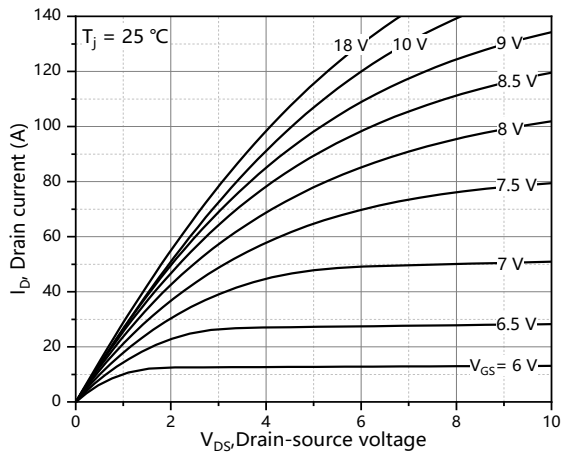


Figure 1. Typ. output characteristics

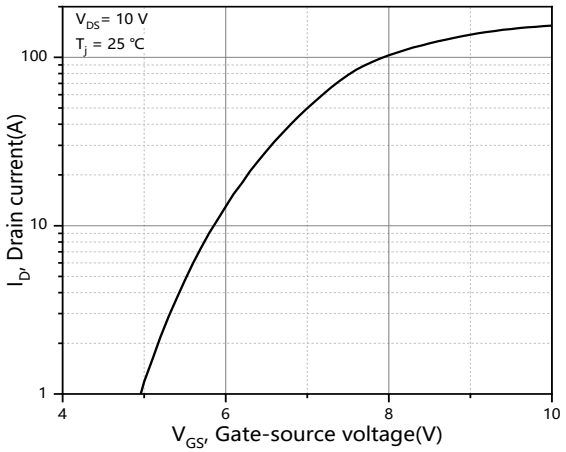


Figure 2. Typ. transfer characteristics

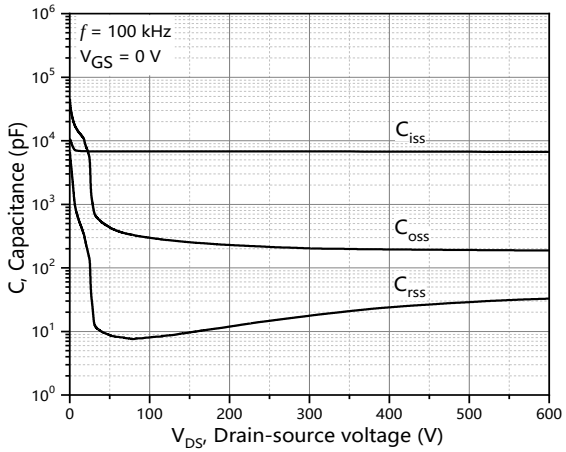


Figure 3. Typ. capacitances

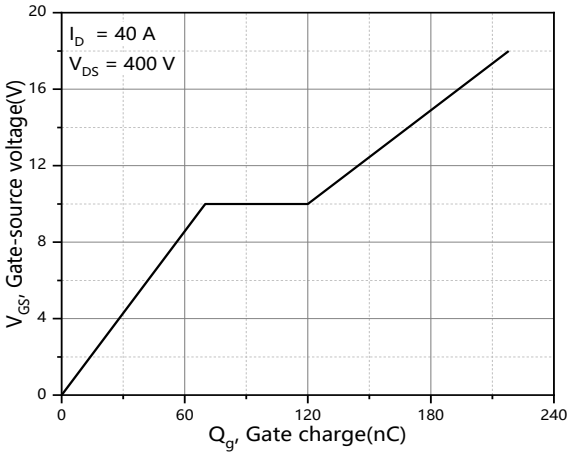


Figure 4. Typ. gate charge

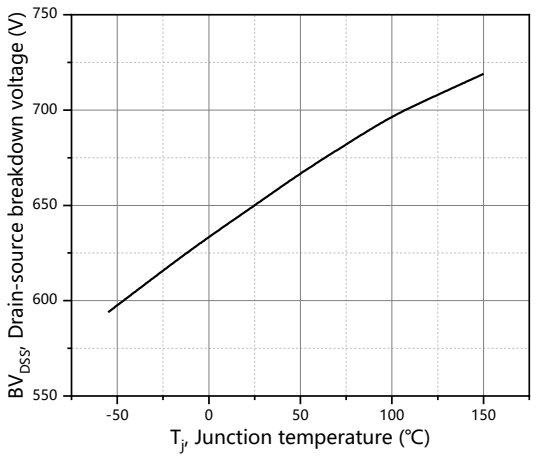


Figure 5. Drain-source breakdown voltage

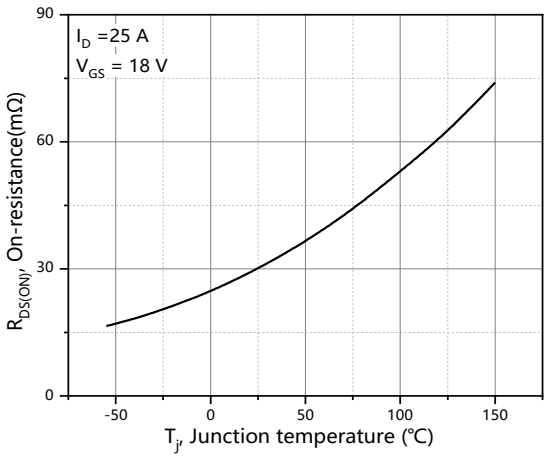


Figure 6. Drain-source on-state resistance

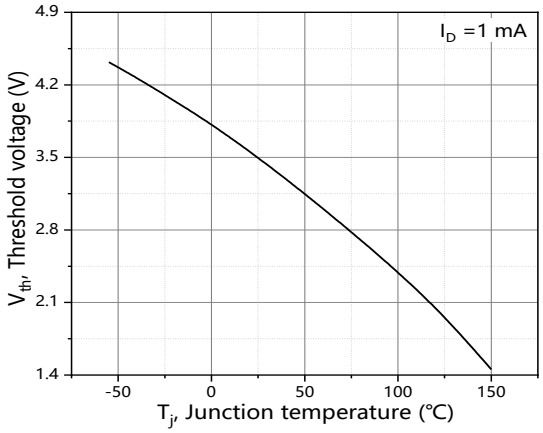


Figure 7. Threshold voltage

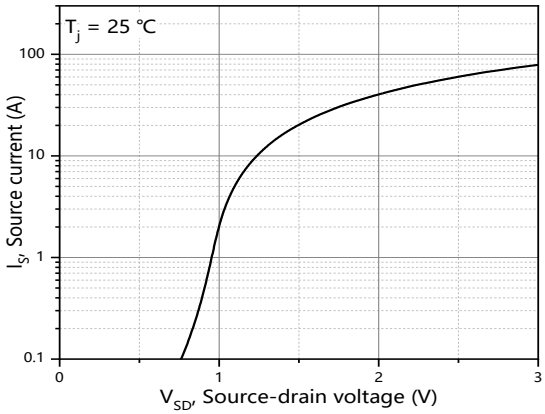


Figure 8. Forward characteristic of body diode

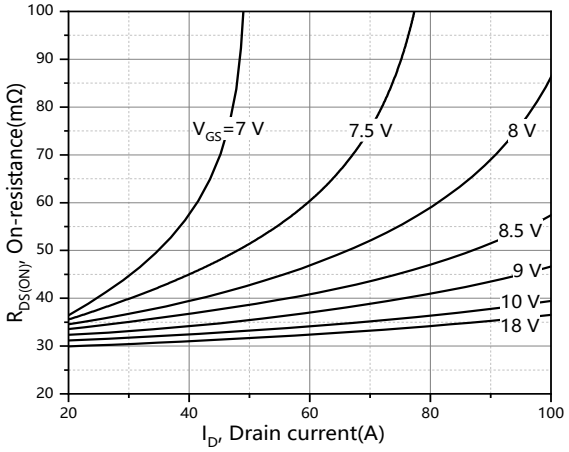


Figure 9. Drain-source on-state resistance

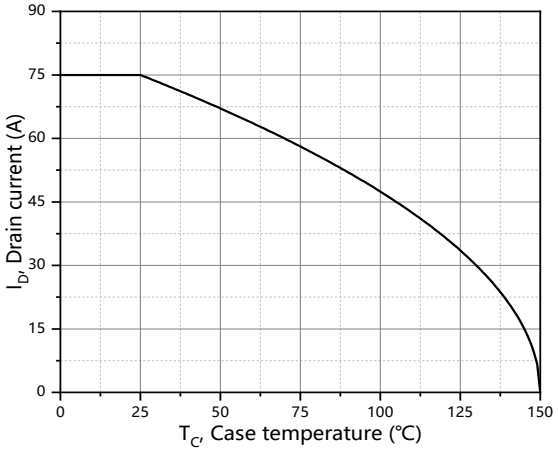


Figure 10. Drain current

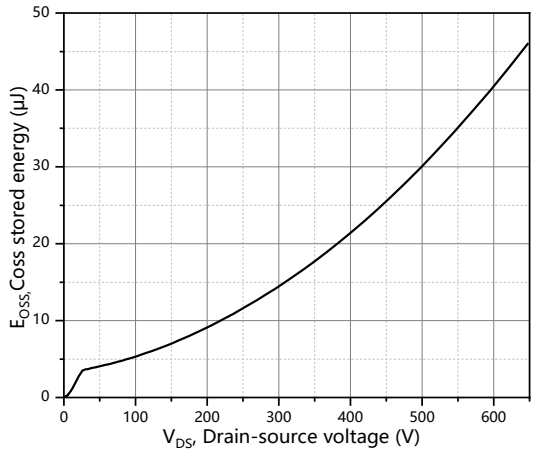


Figure 11. Typ. Coss stored energy

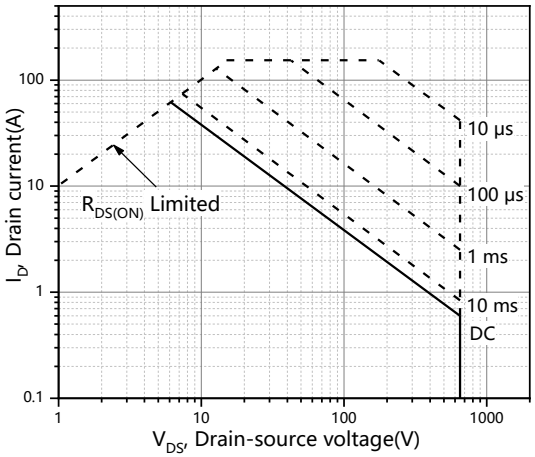


Figure 12. Safe operation area for T_C=25℃

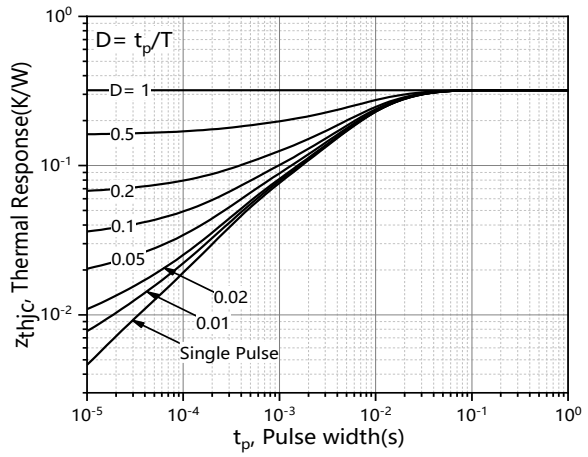


Figure 13. Max transient thermal impedance

Test circuits and waveforms

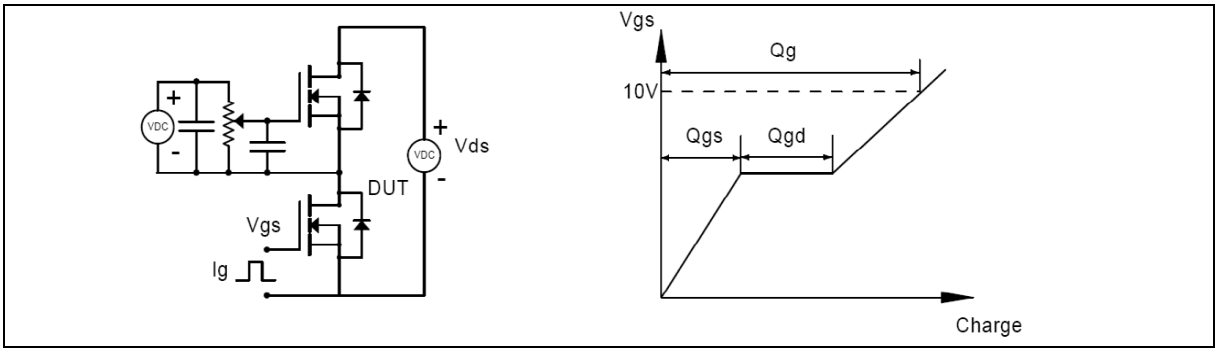


Figure 1. Gate charge test circuit & waveform

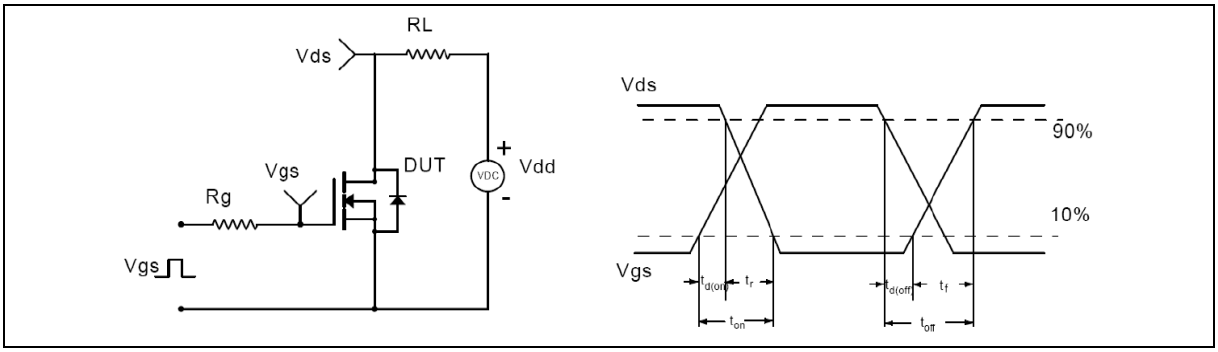


Figure 2. Switching time test circuit & waveforms

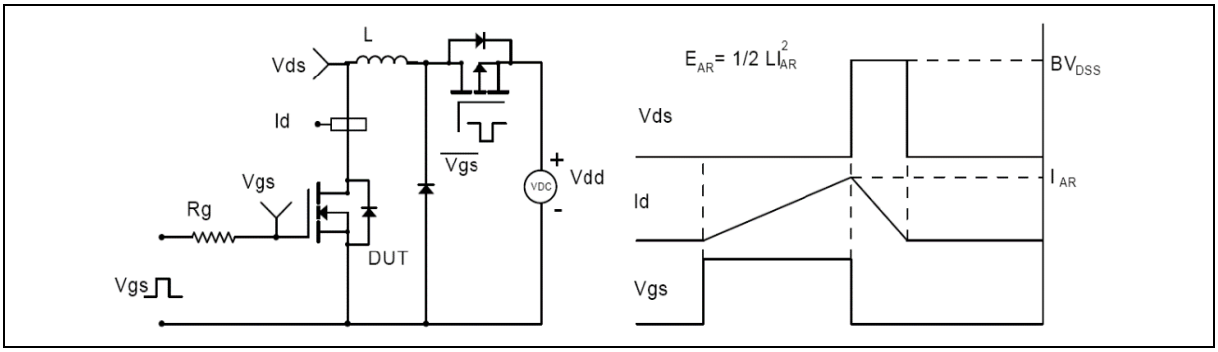


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

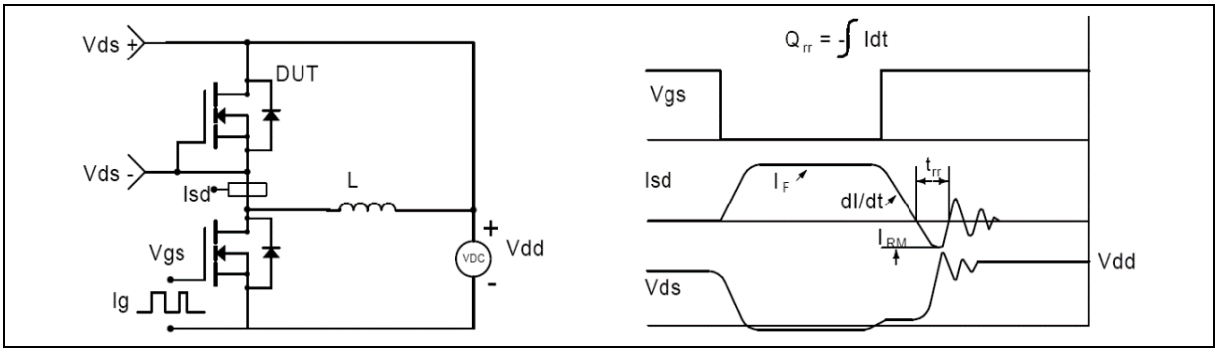
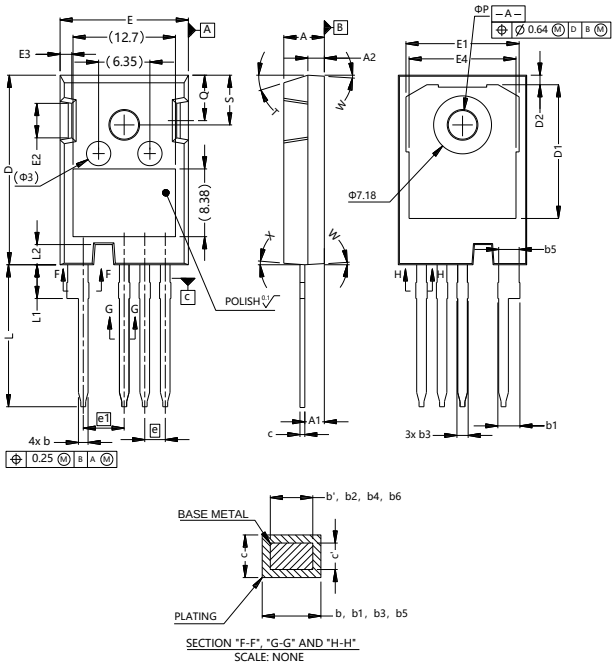


Figure 4. Diode reverse recovery test circuit & waveforms

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
OSS65R040H4T2F	TO247-4L	yes	yes	yes

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