

General Description

The GreenMOS[®] high voltage MOSFET utilizes charge balance technology to achieve outstanding low on-resistance and lower gate charge. It is engineered to minimize conduction loss, provide superior switching performance and robust avalanche capability.

The GreenMOS[®] Generic series is optimized for extreme switching performance to minimize switching loss. It is tailored for high power density applications to meet the highest efficiency standards.

Features

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



Applications

- PC power
- Telecom power
- Server power
- EV Charger
- Motor driver

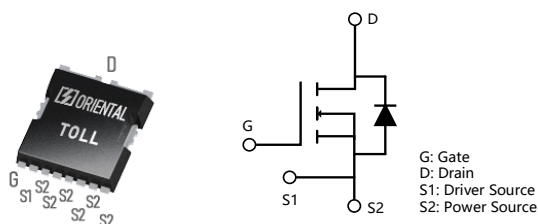
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	600	V
I_D , pulse	255	A
$R_{DS(ON)}$, max @ $V_{GS}=10V$	28	m Ω
Q_g	91.2	nC
PD	500	W

Marking Information

Product Name	Package	Marking
OSG60R028TT4F	TOLL	OSG60R028TT4

Package & Pin Information



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

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	600	V
Gate-source voltage (static)	V _{GS}	±20	V
Gate-source voltage (dynamic)		±30	V
Continuous drain current ¹⁾ , T _C =25 °C	I _D	85	A
Continuous drain current ¹⁾ , T _C =100 °C		53.8	
Pulsed drain current ²⁾ , T _C =25 °C	I _{D, pulse}	255	A
Continuous diode forward current ¹⁾ , T _C =25 °C	I _S	85	A
Diode pulsed current ²⁾ , T _C =25 °C	I _{S, pulse}	255	A
Power dissipation ³⁾ , T _C =25 °C	P _D	500	W
Single pulsed avalanche energy ⁵⁾	E _{AS}	640	mJ
MOSFET dv/dt ruggedness, V _{DS} =0...400 V	dv/dt	100	V/ns
Reverse diode dv/dt, V _{DS} =0...400 V, I _{SD} ≤I _D	dv/dt	15	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 _{θJC}	0.25	°C/W
Thermal resistance, junction-ambient ⁴⁾	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}	600			V	V _{GS} =0 V, I _D =2 mA
Gate threshold voltage	V _{GS(th)}	3.5		4.5	V	V _{DS} =V _{GS} , I _D =2 mA
Drain-source on-state resistance	R _{DS(ON)}		22.7	28	mΩ	V _{GS} =10 V, I _D =26 A
			59.2			V _{GS} =10 V, I _D =26 A, T _j =150 °C
Gate-source leakage current	I _{GSS}			100	nA	V _{GS} =20 V
				-100		V _{GS} =-20 V
Drain-source leakage current	I _{DSS}			1	μA	V _{DS} =600 V, V _{GS} =0 V
Gate resistance	R _G		2.9		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		4100		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		298		pF	
Reverse transfer capacitance	C_{rss}		5.2		pF	
Effective output capacitance, energy related	$C_{o(er)}$		212		pF	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}-400\text{ V}$
Effective output capacitance, time related	$C_{o(tr)}$		1350		pF	
Turn-on delay time	$t_{d(on)}$		29.2		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=38\text{ A}$
Rise time	t_r		20.6		ns	
Turn-off delay time	$t_{d(off)}$		74.6		ns	
Fall time	t_f		12		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		91.2		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=38\text{ A}$
Gate-source charge	Q_{gs}		20.7		nC	
Gate-drain charge	Q_{gd}		39.3		nC	
Gate plateau voltage	$V_{plateau}$		5.8		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=76\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		449.7		ns	$V_R=400\text{ V}$, $I_S=38\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		7.2		μC	
Peak reverse recovery current	I_{rrm}		28.4		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.
- 4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^{\circ}\text{C}$.
- 5) $V_{DD}=100\text{ V}$, $V_{GS}=10\text{ V}$, $L=80\text{ mH}$, starting $T_j=25\text{ }^{\circ}\text{C}$.

Electrical Characteristics Diagrams

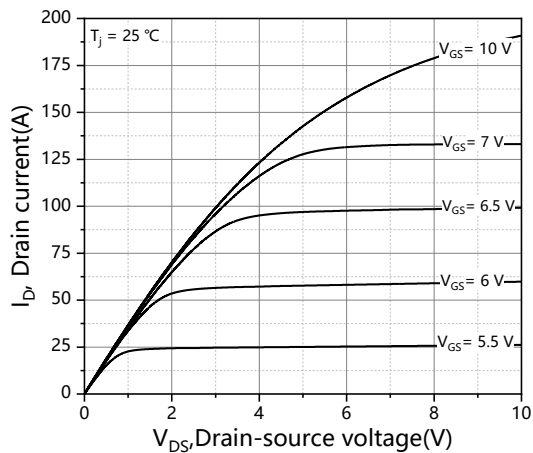


Figure 1. Typ. output characteristics $T_j=25^{\circ}\text{C}$

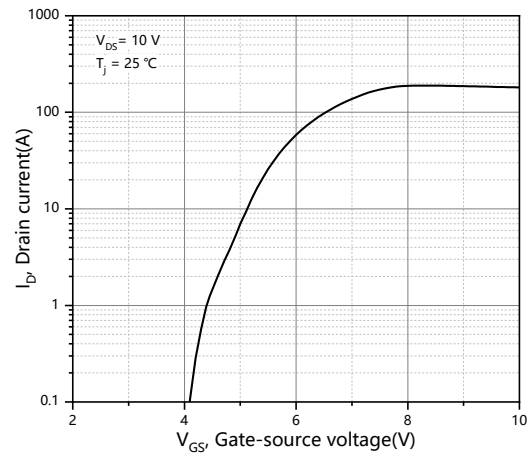


Figure 2. Typ. transfer characteristics

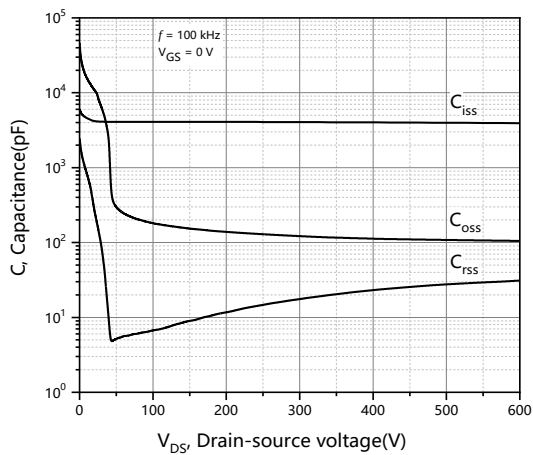


Figure 3. Typ. capacitances

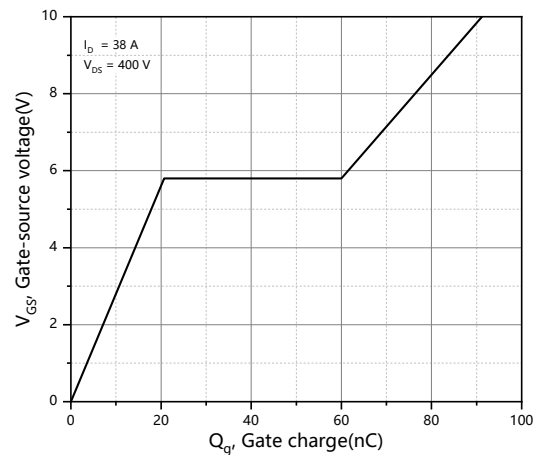


Figure 4. Typ. gate charge

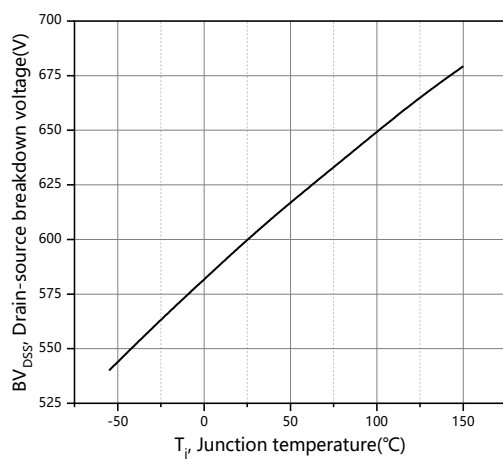


Figure 5. Drain-source breakdown voltage

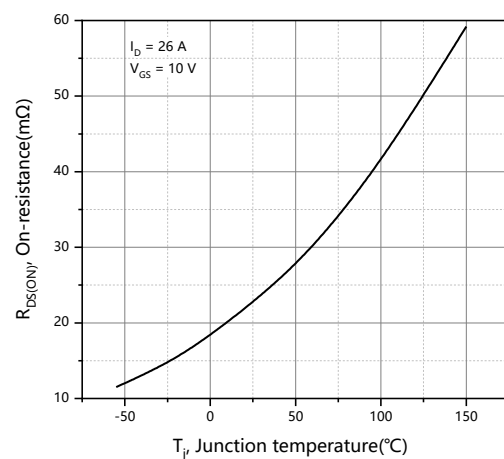


Figure 6. Drain-source on-state resistance

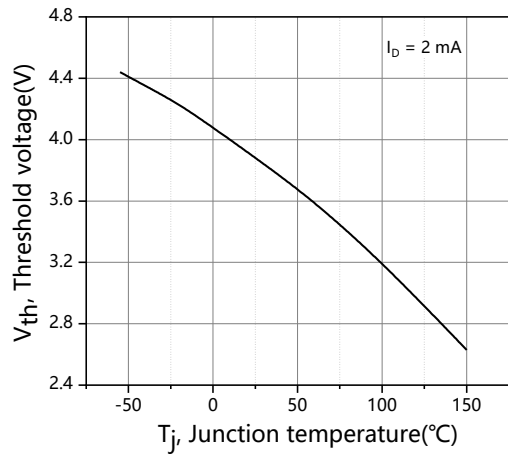


Figure 7. Threshold voltage

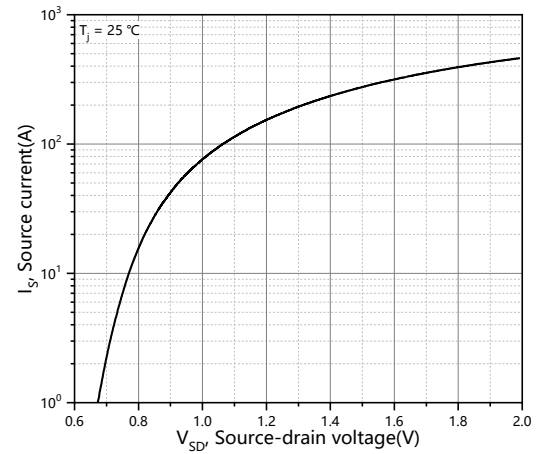


Figure 8. Forward characteristic of body diode

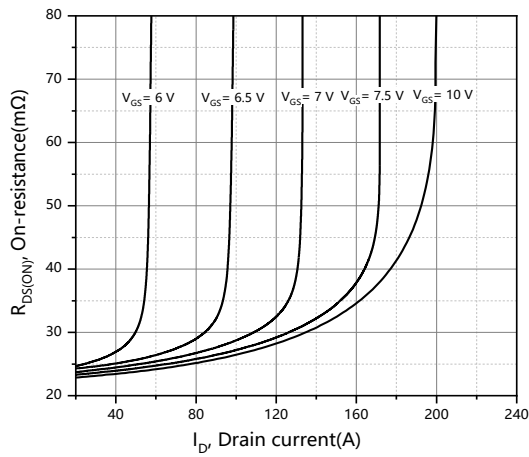


Figure 9. Drain-source on-state resistance

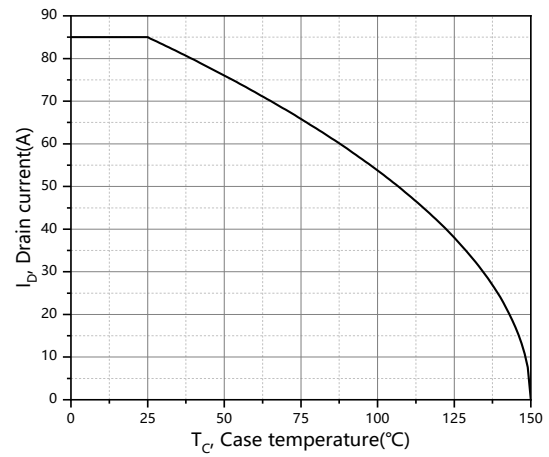


Figure 10. Drain current

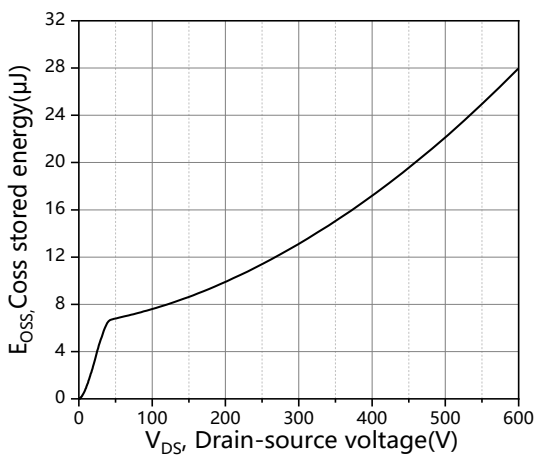


Figure 11. Typ. Coss stored energy

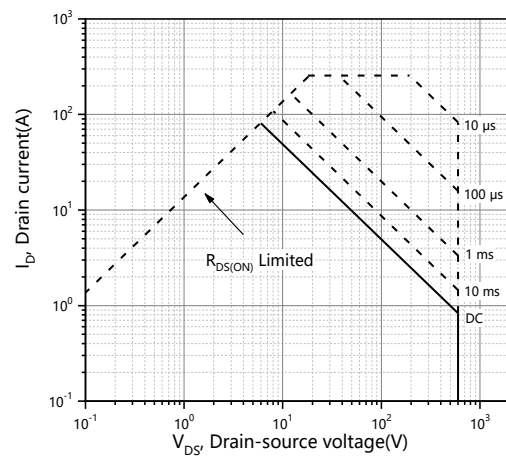
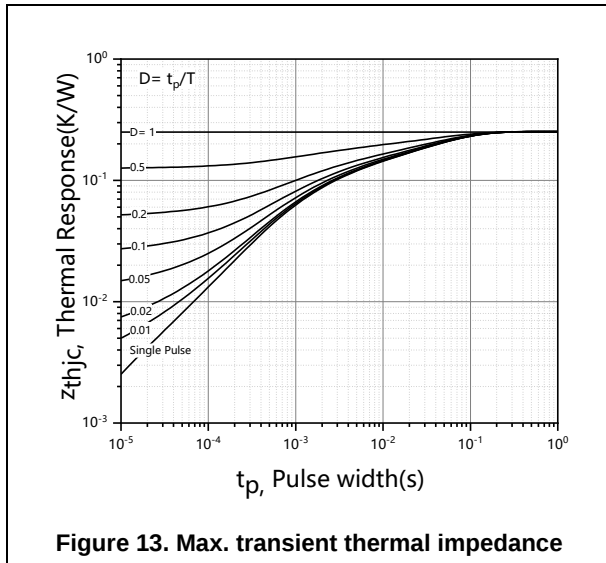


Figure 12. Safe operation area $T_C=25^\circ\text{C}$



Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

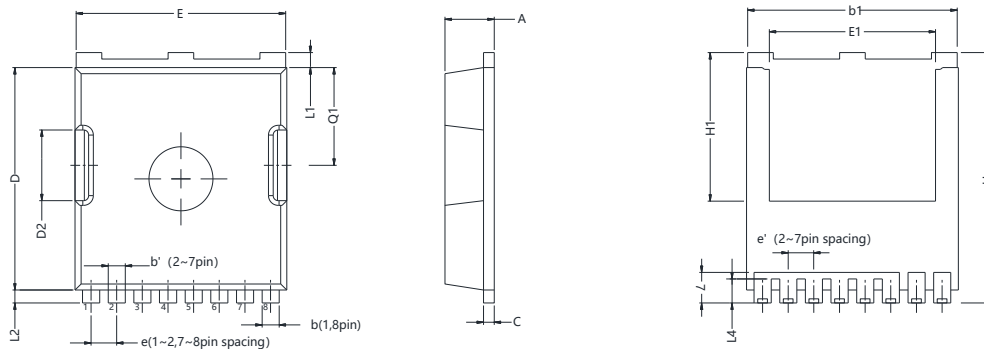


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.15	2.30	2.45
b	0.75	0.75	0.85
b'	0.70	0.70	0.80
b1	9.65	9.80	9.95
C	0.45	0.50	0.60
D	10.18	10.38	10.58
D2	3.15	3.30	3.45
E	9.70	9.90	10.10
E1	7.95	8.10	8.25
e	BSC 1.225		
e'	BSC 1.20		
Q1	4.40	4.55	4.70
H	11.48	11.68	11.88
H1	6.80	6.95	7.10
L	1.60	1.80	2.00
L1	0.50	0.70	0.90
L2	0.48	0.60	0.72
L4	1.00	1.15	1.30

Version : TOLL-P package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TOLL-P	1200	1	1200	5	6000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG60R028TT4F	TOLL	yes	yes	yes

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Revision History

Version	Revision History	Date
V1.0	Initial release	2025-10-27