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

GreenMOS®

RoHS compliant

Applications

- LED lighting
- Telecom
- Adapter
- Sever
- Solar/UPS

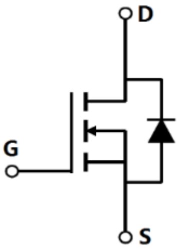
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	650	V
$I_{D,\ pulse}$	54	A
$R_{DS(ON),\ max}$ @ V_{GS}=10V	180	mΩ
Q_g	23	nC
PD	34	W

Marking Information

Product Name	Package	Marking
OSG65R180FT3F_NB	TO220F-NL	OSG65R180FT3

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 (static)	V_{GS}	±20	V
Gate-source voltage (dynamic)		±30	V
Continuous drain current[1], T_C=25 °C	I_D	18	A
Continuous drain current[1], T_C=100 °C		11	
Pulsed drain current[2], T_C=25 °C	$I_{D,\ pulse}$	54	A
Continuous diode forward current[1], T_C=25 °C	I_S	18	A
Diode pulsed current[2], T_C=25 °C	$I_{S,\ pulse}$	54	A
Power dissipation[3], T_C=25 °C	P_D	34	W
Single pulsed avalanche energy[4]	E_{AS}	210	mJ
MOSFET dv/dt ruggedness, V_{DS}=0…400 V	dv/dt	100	V/ns
Reverse diode dv/dt, V_{DS}=0…400 V, $I_{SD} \leq I_D$	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	$R_{\theta JC}$	3.67	°C/W
Thermal resistance, junction-ambient	$R_{\theta JA}$	62.5	°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=250 μA
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		148	180	mΩ	V_{GS}=10 V, I_D=10 A
			339			V_{GS}=10 V, I_D=10 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}=650 V, V_{GS}=0 V
Gate resistance	R_G		22		Ω	f=1 MHz, Open drain

Dynamic Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Input capacitance	C_{iss}		1058		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		76		pF	
Reverse transfer capacitance	C_{rss}		1.7		pF	
Effective output capacitance, energy related	$C_{o(er)}$		50		pF	V_{GS}=0 V, V_{DS}=0 V-400 V
Effective output capacitance, time related	$C_{o(tr)}$		290		pF	
Turn-on delay time	$t_{d(on)}$		16		ns	V_{GS}=10 V, V_{DS}=400 V, R_G=2 Ω, I_D=10 A
Rise time	t_r		30		ns	
Turn-off delay time	$t_{d(off)}$		68		ns	
Fall time	t_f		26		ns	

Gate Charge Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Total gate charge	Q_g		23		nC	V_{GS}=10 V, V_{DS}=400 V, I_D=10 A
Gate-source charge	Q_{gs}		5		nC	
Gate-drain charge	Q_{gd}		8.4		nC	
Gate plateau voltage	$V_{plateau}$		5.4		V	

Body Diode Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Diode forward voltage	V_{SD}			1.3	V	I_S=20 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		255		ns	V_R=400 V, I_S=10 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		2.7		μC	
Peak reverse recovery current	I_{rrm}		19		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.
4) V_{DD}=100 V, V_{GS}=10 V, L=75 mH, starting T_j=25 °C.

Electrical Characteristics Diagrams

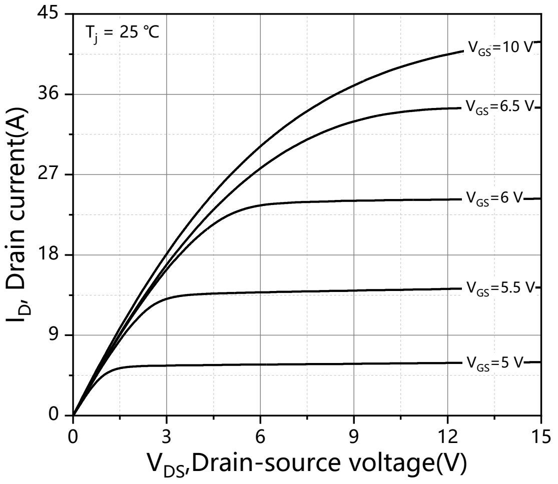


Figure 1. Typ. output characteristics T_j=25℃

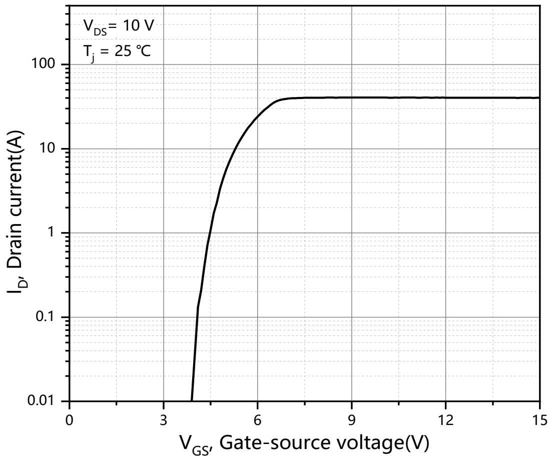


Figure 2. Typ. transfer characteristics

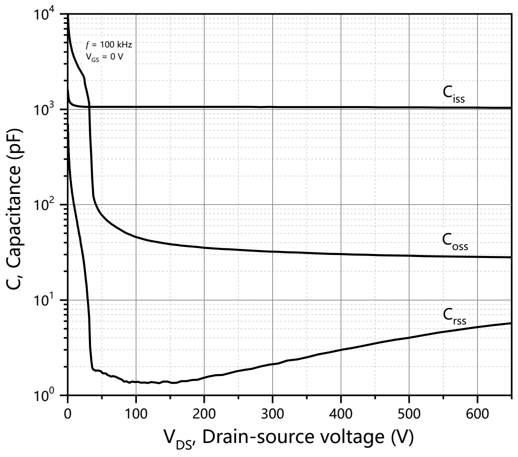


Figure 3. Typ. capacitances

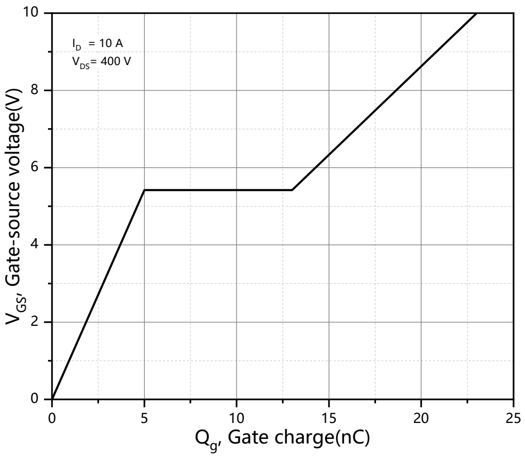


Figure 4. Typ. gate charge

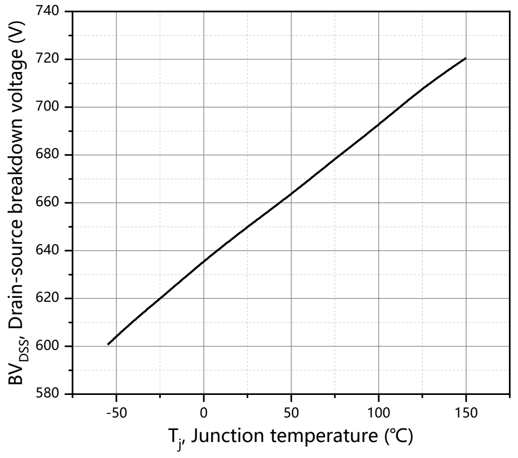


Figure 5. Drain-source breakdown voltage

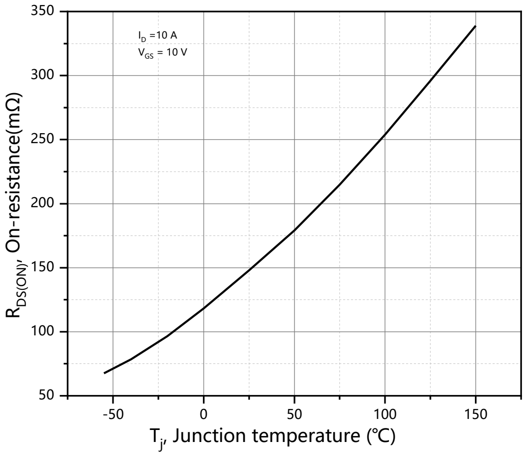


Figure 6. Drain-source on-state resistance

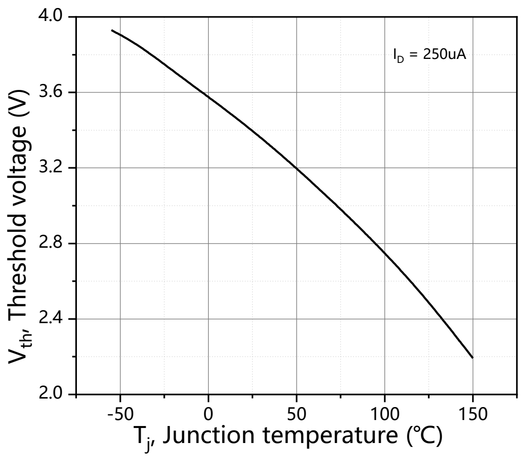


Figure 7. Threshold voltage

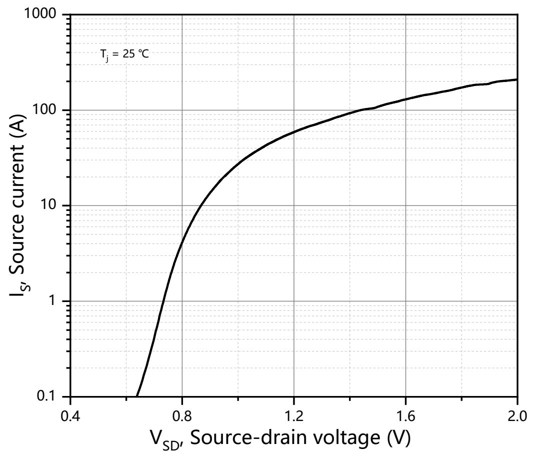


Figure 8. Forward characteristic of body diode

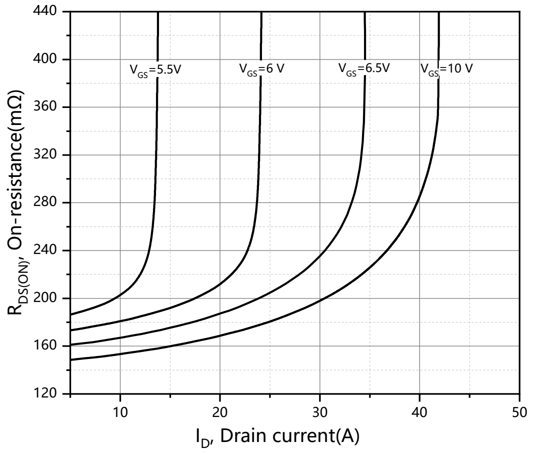


Figure 9. Drain-source on-state resistance

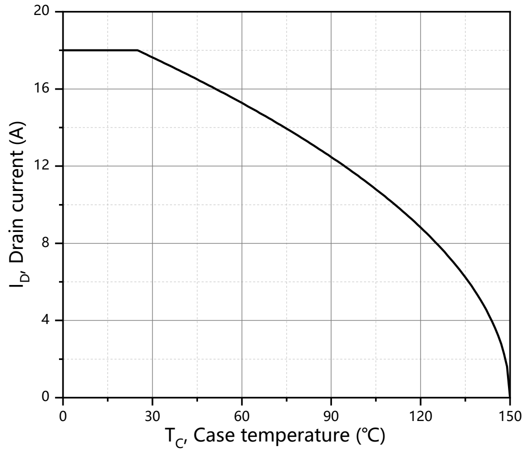


Figure 10. Drain current

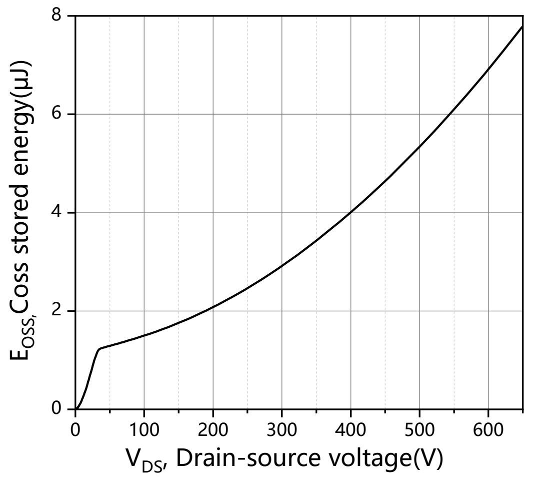


Figure 11. Typ. Coss stored energy

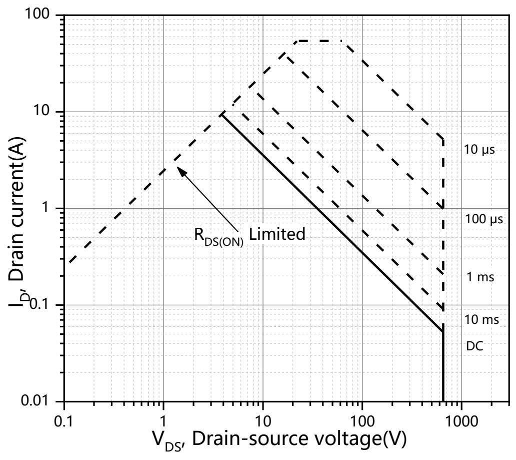


Figure 12. Safe operation area Tc=25℃

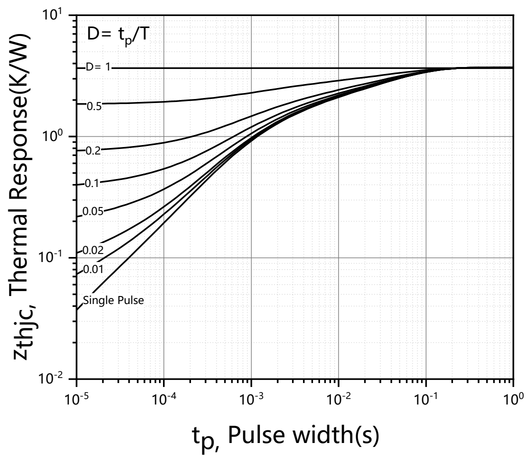


Figure 13. Max. transient thermal impedance

Test circuits and waveforms

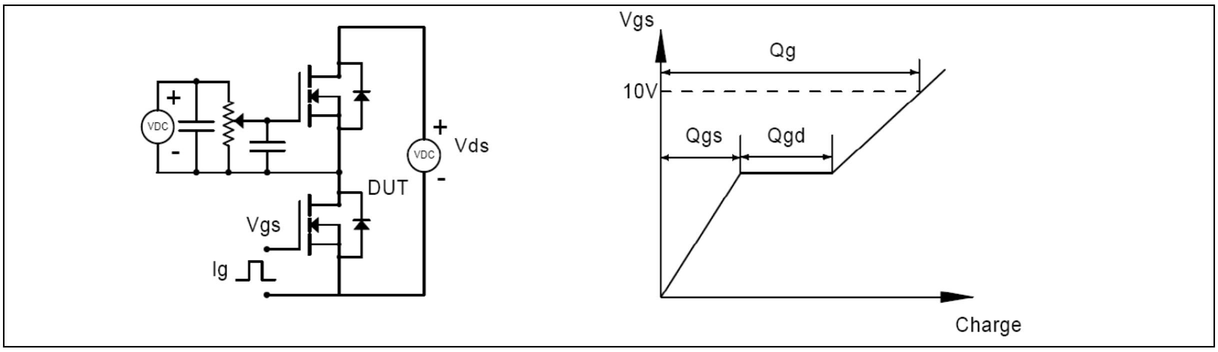


Figure 1. Gate charge test circuit & waveform

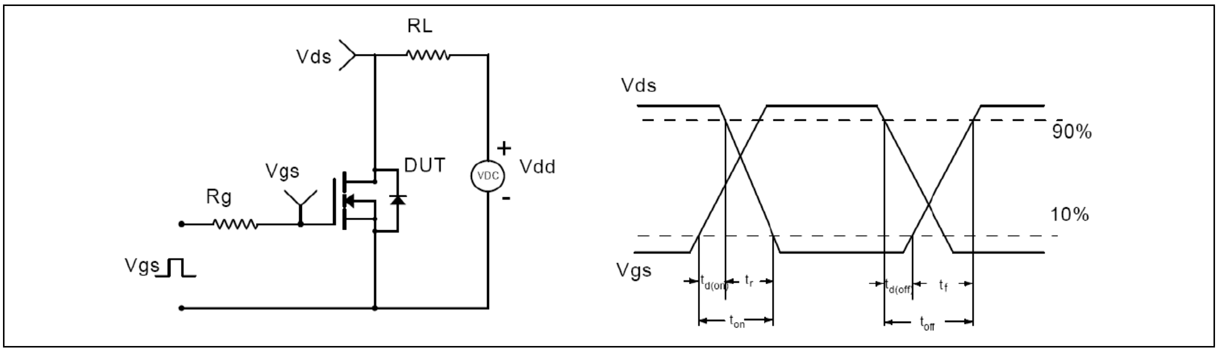


Figure 2. Switching time test circuit & waveforms

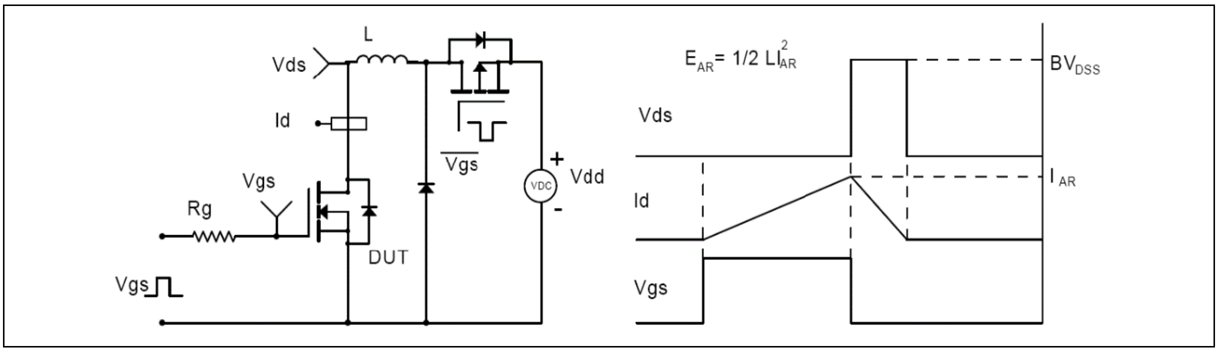


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

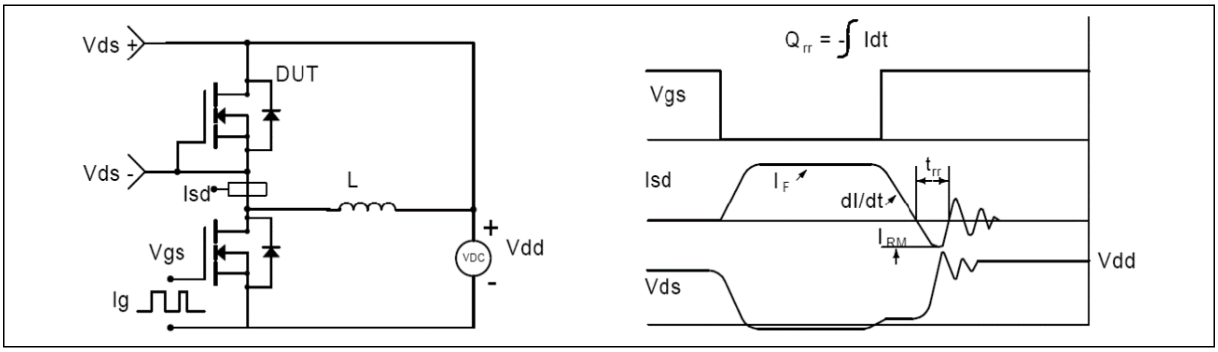
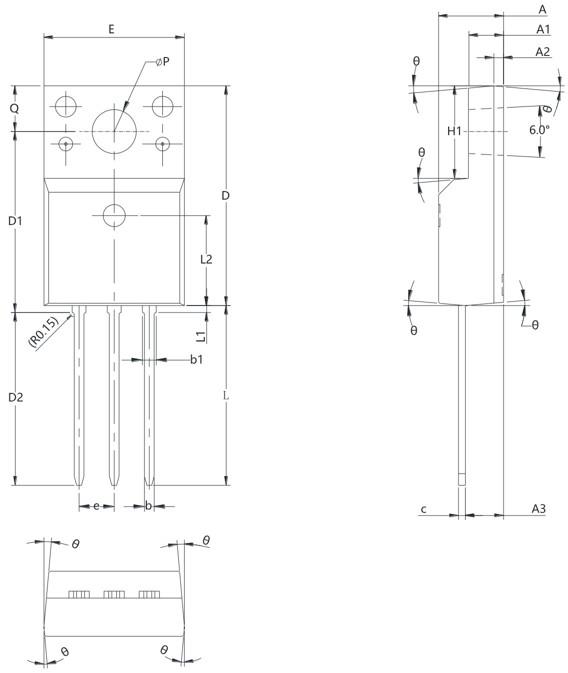


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.5	4.7	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.6	-	0.8
b1	0.9	-	1.1
c	0.45	0.5	0.6
D	15.67	15.87	16.07
D1	12.87	13.07	13.27
D2	12.28	12.48	12.68
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	0.85
L2	6.50 REF		
ΦP	3.08	3.18	3.28
Q	3.20	-	3.40
θ1	1º	3º	5º

Version： TO220F_NL-J package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO220F-NL-J	50	20	1000	6	6000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R180FT3F_NB	TO220F-NL	yes	yes	yes

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