Wuxi Unigroup Microelectronics Co.,Ltd.

60V N-Channel Trench MOSFET

General Description

- **Trench Power SGT technology**
- Very low on-resistance $R_{DS(ON)}$
- Low Gate Charge
- Excellent Gate Charge x $R_{DS(ON)}$ Product

Applications

- High Frequency Switching and Synchronous Rectification

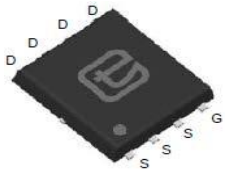
Product Summary

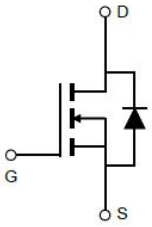
V_{DS}	60V
I_D (at V_{GS} =10V)	60A
$R_{DS(ON)}$ (at V_{GS} =10V)	< 9mΩ
$R_{DS(ON)}$ (at V_{GS} =4.5V)	< 13.5mΩ

100% UIS Tested

RoHS

DFN5x6





Part Number	Package Type	Form	Marking
TSG12N06AT	DFN5×6	Tape & Reel	D12N06AT

Absolute Maximum Ratings (T_A =25ºC unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current B	T_C =25ºC	I_D	60	A
	T_C =100ºC		36	
Pulsed Drain Current A		I_{DM}	240	A
Avalanche Current A		I_{AS}	36	A
Single Pulse Avalanche Energy L =0.3mH A		E_{AS}	65	mJ
Power Dissipation C	T_C =25ºC	P_D	56.5	W
	T_C =100ºC		44	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	ºC

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.7	ºC/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	50	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =250μA,V_{GS} =0V		60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =60V, V_{GS} =0V	T_J =25ºC	--	--	1	μA
			T_J =125ºC	--	--	100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V		--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =250μA		1.1	--	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D = 20A		--	6.5	9	mΩ
		V_{GS} = 4.5V, I_D = 20A		--	10.7	13.5	mΩ
g_{FS}	Forward Transconductance	V_{DS} =5V, I_D =20A		--	85	--	S
V_{SD}	Diode Forward Voltage	I_S =1A, V_{GS} =0V		--	--	1	V
I_S	Maximum Body-Diode Continuous Current [B]			--	--	46	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =30V, f =1MH_Z		--	2455	--	pF
C_{oss}	Output Capacitance			--	240	--	
C_{rss}	Reverse Transfer Capacitance			--	34	--	
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =10V,V_{DS} =30V, I_D =20A		--	45	--	nC
Q_g(4.5V)				--	24	--	
Q_{gs}	Gate Source Charge			--	6.8	--	
Q_{gd}	Gate Drain Charge			--	11.5	--	
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =30V, I_D =20A, R_G =3Ω		--	8	--	ns
t_r	Turn-On Rise Time			--	3	--	
$T_{D(off)}$	Turn-Off Delay Time			--	25	--	
t_f	Turn-Off Fall Time			--	4	--	
t_{rr}	Body Diode Reverse Recovery Time	I_F =20A, di/dt =500A/μs		--	25	--	ns
Q_{rr}	Body Diode Reverse Recovery Charge			--	110	--	nC

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =175ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

Typical Characteristics T_J = 25ºC, unless otherwise noted

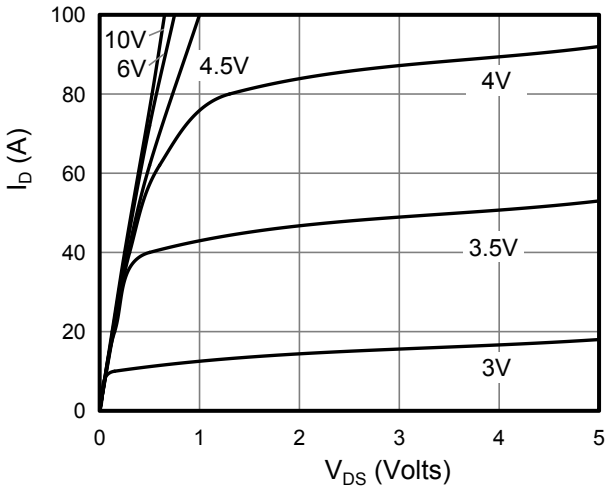


Figure 1: On-Region Characteristics Characteristics

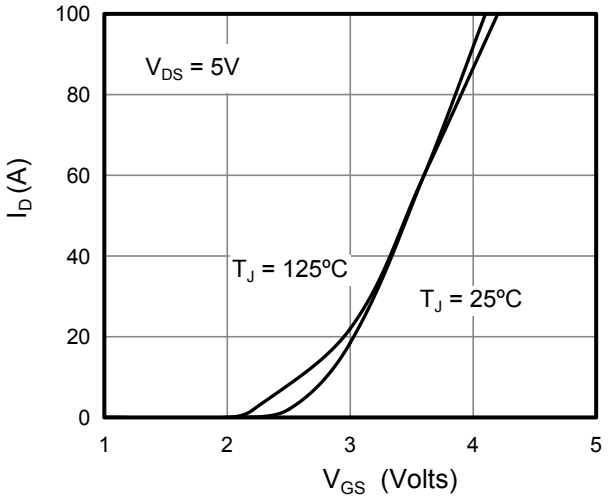


Figure 2: Transfer

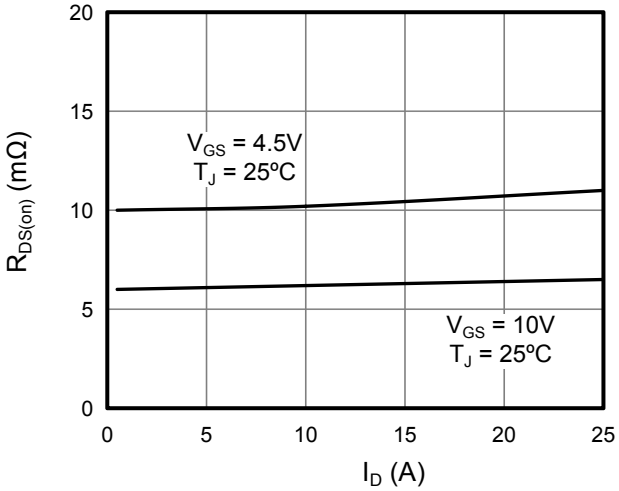


Figure 3: On-Resistance vs. Drain Current

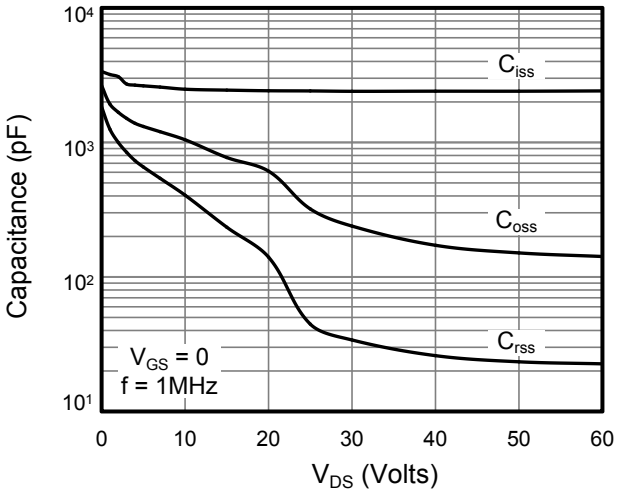


Figure 4: Capacitance Characteristics

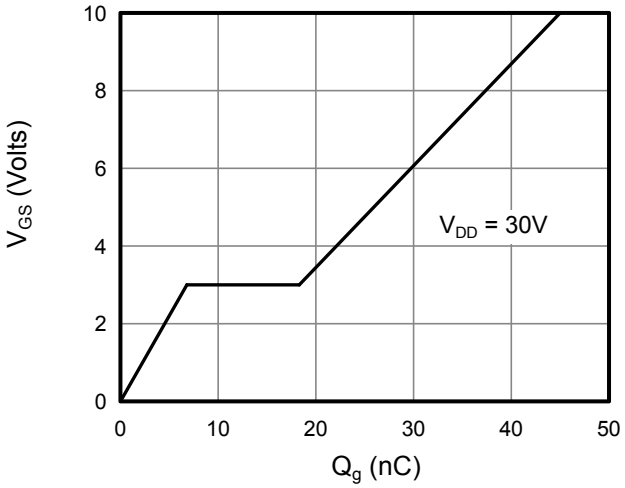


Figure 5: Gate Charge Characteristics

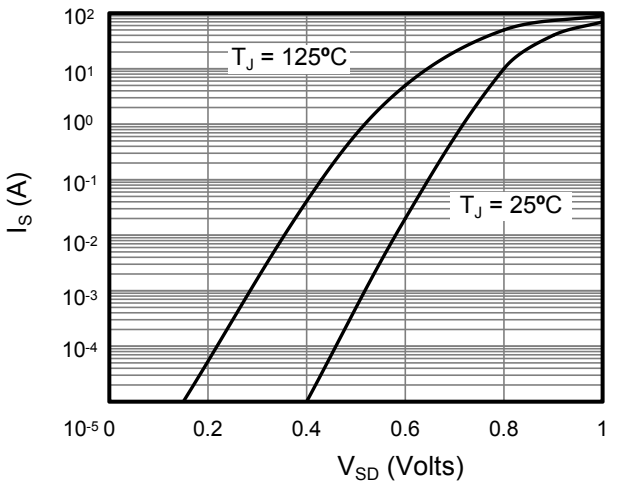


Figure 6: Body Diode Forward Voltage

Typical Characteristics T_J = 25ºC, unless otherwise noted

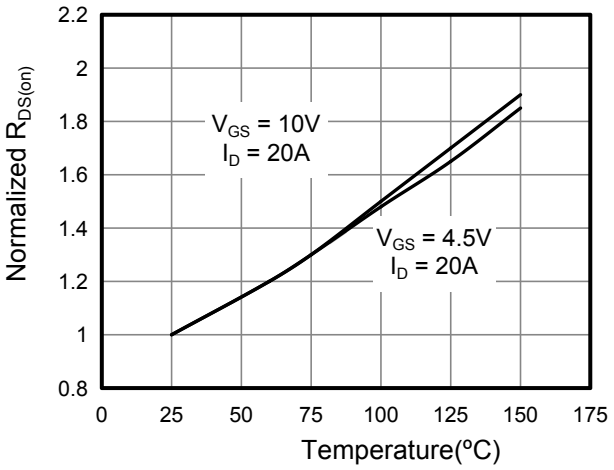


Figure 7: On-Resistance vs. Junction Temperature

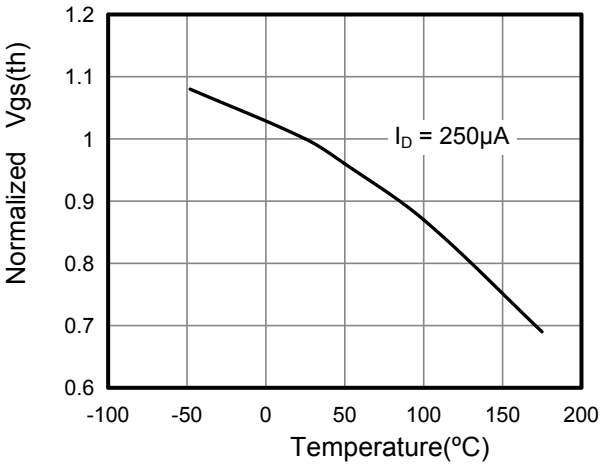


Figure 8: Vgs(th) vs. Junction Temperature

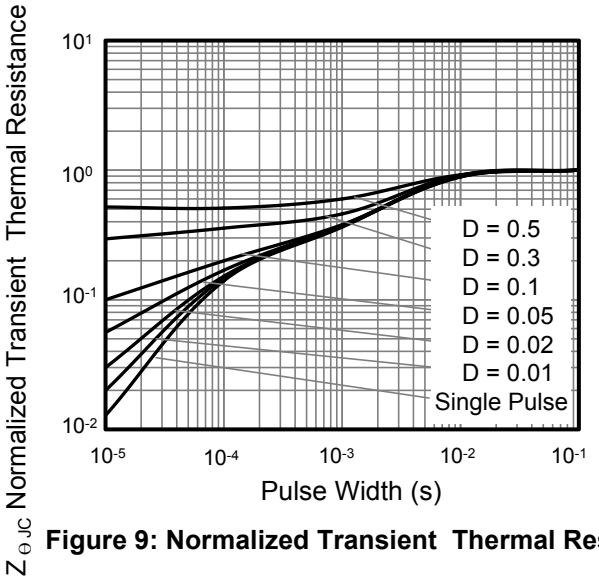


Figure 9: Normalized Transient Thermal Resistance

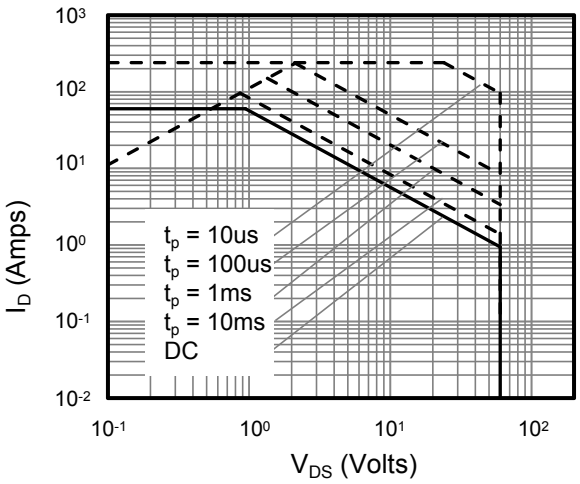


Figure 10: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

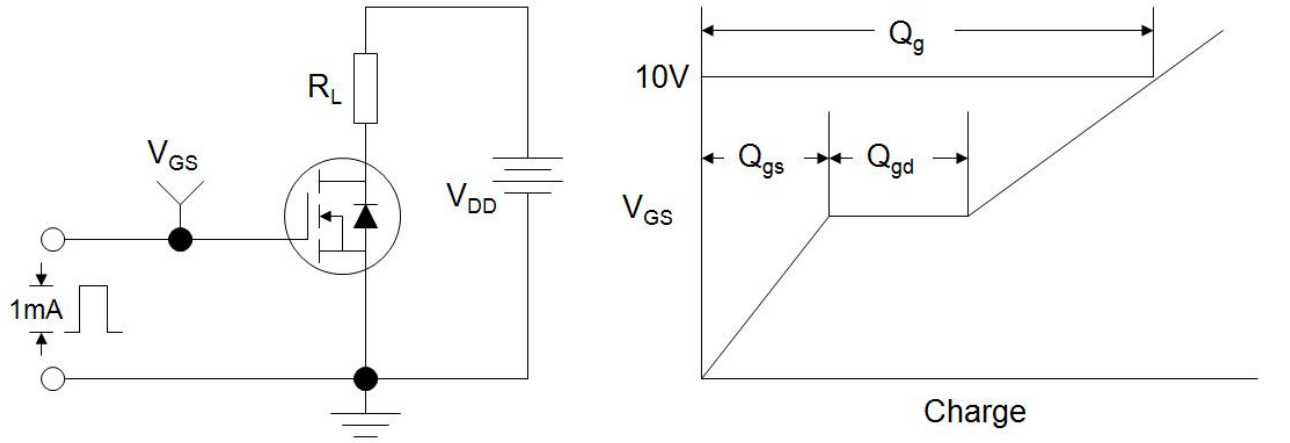


Figure B：Resistive Switching Test Circuit and Waveform

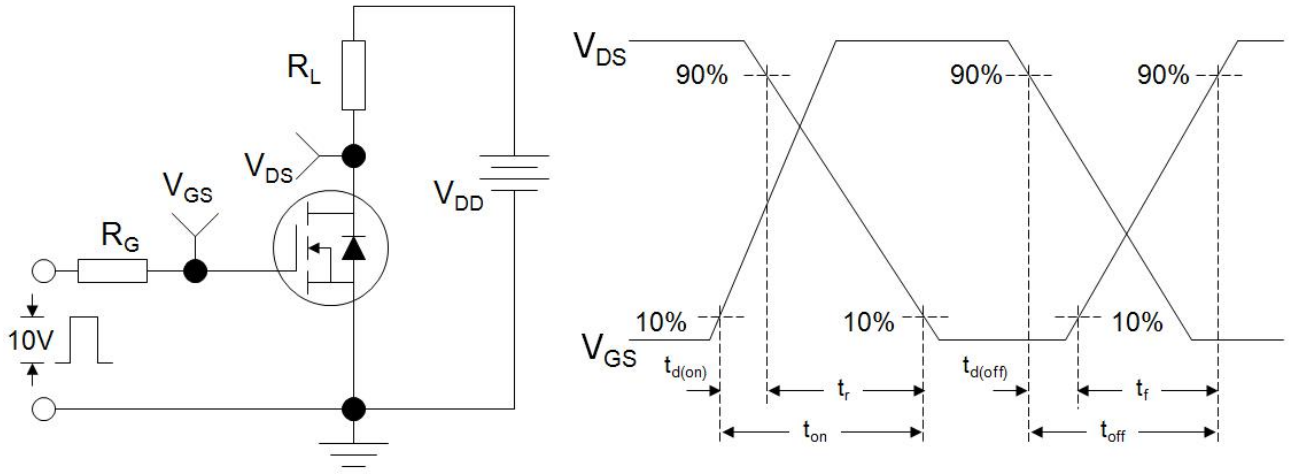
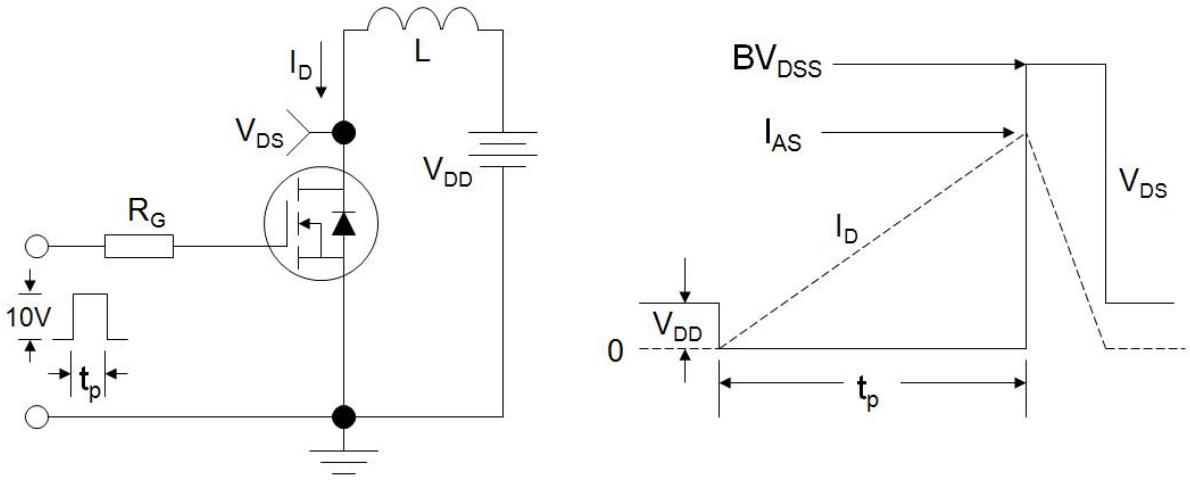
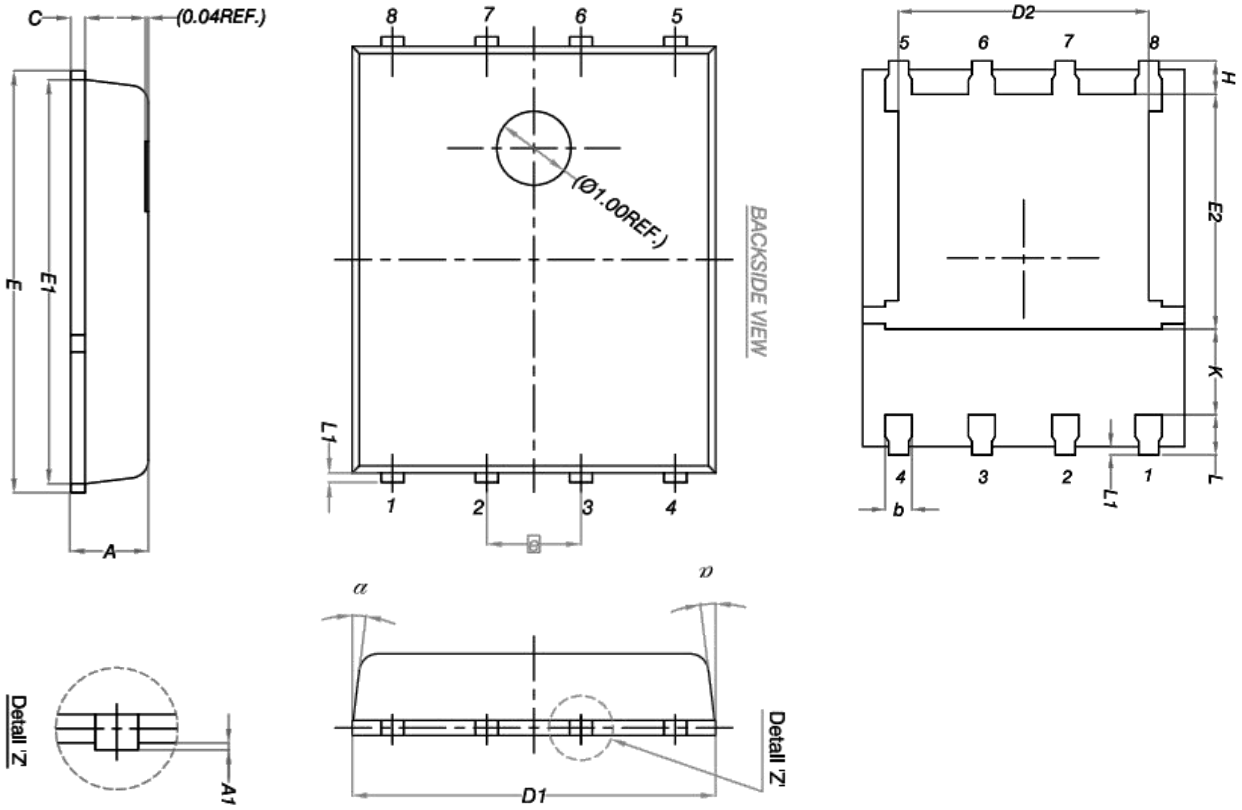


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



DFN5x6（封装厂 M）



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

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