

Gate Resistor installed Dual N-Channel MOS FET

■ Features

- Low Source-source On-state Resistance: $R_{SS(on)typ.} = 8.7\text{ m}\Omega$ ($V_{GS} = 4.5\text{ V}$)
- CSP package: smallest & thinnest size
- Halogen-free / RoHS compliant
(EU RoHS / UL-94 V-0 / MSL: Level 1 compliant)

■ Packaging

Unit: mm

The drawing illustrates the MBGA006-W-1723APA package with the following dimensions and features:

- Top View:** A rectangular package with a total width of 2.32 mm. The width is divided into three segments: 0.6 mm (left), 1.0 mm (center), and 0.72 mm (right). The height is 1.67 mm.
- Side View:** Shows a maximum height of 0.2 mm.
- Bottom View:** Shows a 3x3 grid of pins. The central pin is marked with a diagonal line. Pin locations are defined by dimensions: 0.65 mm from the left and right edges, and 0.15 mm from the top and bottom edges. The central pin is offset by 0.65 mm from the center lines. The corners are marked with (0, 51).

Pin Locations:

Pin Number	Location
1. Source (FET1)	Pin 1 (Bottom Left)
2. Gate (FET1)	Pin 2 (Bottom Center-Left)
3. Source (FET1)	Pin 3 (Bottom Center-Right)
4. Source (FET2)	Pin 4 (Bottom Right)
5. Gate (FET2)	Pin 5 (Top Right)
6. Source (FET2)	Pin 6 (Top Center-Right)

Internal Connection

1, 3 5 4, 6

Pin Name

1. Source (FET1)	4. Source (FET2)
2. Gate (FET1)	5. Gate (FET2)
3. Source (FET1)	6. Source (FET2)

Parameter		Symbol	Rating	Unit
FET1	Source-source Voltage	VSS	12	V
	Gate-source Voltage	VGS	±12	V
FET2	Source Current (DC) ^{*1}	IS	6	A
	Source Current (Pulsed) ^{*1,*2}	ISp	60	A
Overall	Total Power Dissipation ^{*1}	PD	0.45	W
	Channel Temperature	Tch	150	°C
	Storage Temperature Range	Tstg	-55 to +150	°C

Parameter	Symbol	Rating	Unit
Thermal Resistance, Channel to Ambient	Rth (ch-a)	278	°C/W

Note	*1	Mounted on FR4 board (25.4 mm × 25.4 mm × t1.0 mm). Surface Mounted on FR4 Board using the minimum recommended pad size (Cu area = 47 mm ² including traces).
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*2 $t = 10 \mu s$, Duty Cycle $\leq 1 \%$

■ Electrical Characteristics Ta = 25 °C ± 3 °C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	IS = 1 mA, VGS = 0 V	12			V
Zero Gate Voltage source Current	ISSS	VSS = 12 V, VGS = 0 V			1.0	μA
Gate-source Leakage Current	IGSS1	VGS = ±5.0 V, VSS = 0 V		±0.50	±1.0	μA
	IGSS2	VGS = ±4.3 V, VSS = 0 V		±0.25	±0.5	
	IGSS3	VGS = ±4.1 V, VSS = 0 V		±0.20	±0.4	
	IGSS4	VGS = ±3.8 V, VSS = 0 V		±0.18	±0.36	
	IGSS5	VGS = ±3.5 V, VSS = 0 V		±0.15	±0.3	
	IGSS6	VGS = ±3.0 V, VSS = 0 V		±0.10	±0.2	
	IGSS7	VGS = ±2.5 V, VSS = 0 V		±0.05	±0.1	
Gate-source Threshold Voltage	Vth	IS = 1.0 mA, VSS = 10.0 V	0.4	0.85	1.4	V
Source-source On-State Resistance	RSS(on)1	IS = 3.5 A, VGS = 4.5 V	6.0	8.7	12.0	mΩ
	RSS(on)2	IS = 3.5 A, VGS = 3.8 V	6.5	9.0	12.5	
	RSS(on)3	IS = 3.5 A, VGS = 3.1 V	7.0	10.5	15.5	
	RSS(on)4	IS = 3.5 A, VGS = 2.5 V	8.0	12.5	19.0	
Input Capacitance ^{*1}	Ciss	VSS = 10 V, VGS = 0 V, f = 1MHz		2 300		pF
Output Capacitance ^{*1}	Coss			680		
Reverse Transfer Capacitance ^{*1}	Crss			670		
Turn-on Delay Time ^{*1,*2}	td(on)	VDD = 10 V, VGS = 0 to 4.0 V		5.2		μs
Rise Time ^{*1,*2}	tr	IS = 3.5 A		19.0		
Turn-off Delay Time ^{*1,*2}	td(off)	VDD = 10 V, VGS = 4.0 to 0 V		3.5		μs
Fall Time ^{*1,*2}	tf	IS = 3.5 A		8.2		
Total Gate Charge ^{*1}	Qg	VDD = 10 V, VGS = 0 to 4.0 V IS = 6 A		30.0		nC
Gate-source Charge ^{*1}	Qgs			6.5		
Gate-drain Charge ^{*1}	Qgd			10.0		
Body Diode Forward Voltage	VF(s-s)	IF = 6.0 A, VGS = 0 V		0.8	1.2	V

Note: ^{*1} Assured by design

^{*2} See Test circuit

DESTRUCTION CURRENT

	Condition	Result
Operation test	VGS = 3.8 V t = 3 ms, IS = 40 A	PASS
	VGS = 3.8 V t = 11 ms, IS = 15 A	PASS
Destruction current	VGS = 3.8 V t = 3 ms	95 A
	VGS = 3.8 V t = 11 ms	63 A

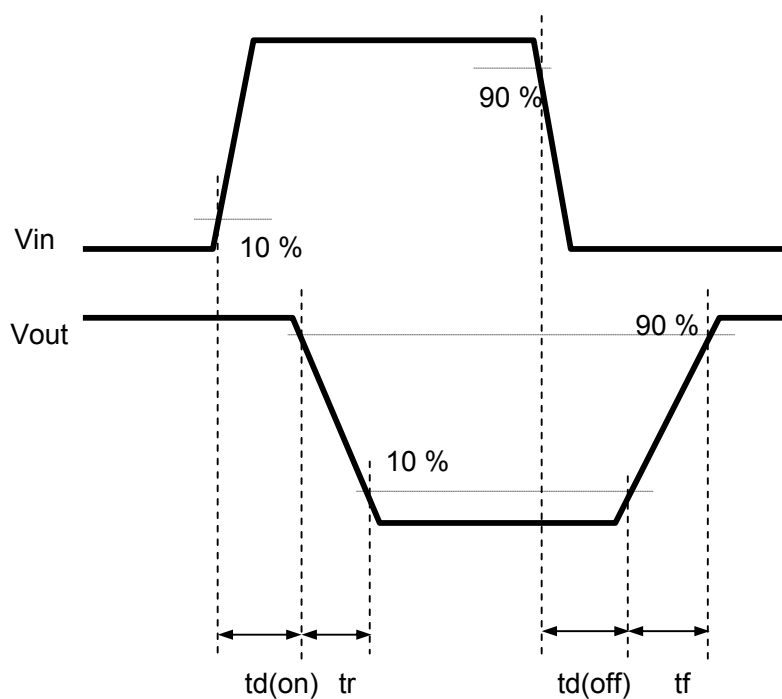
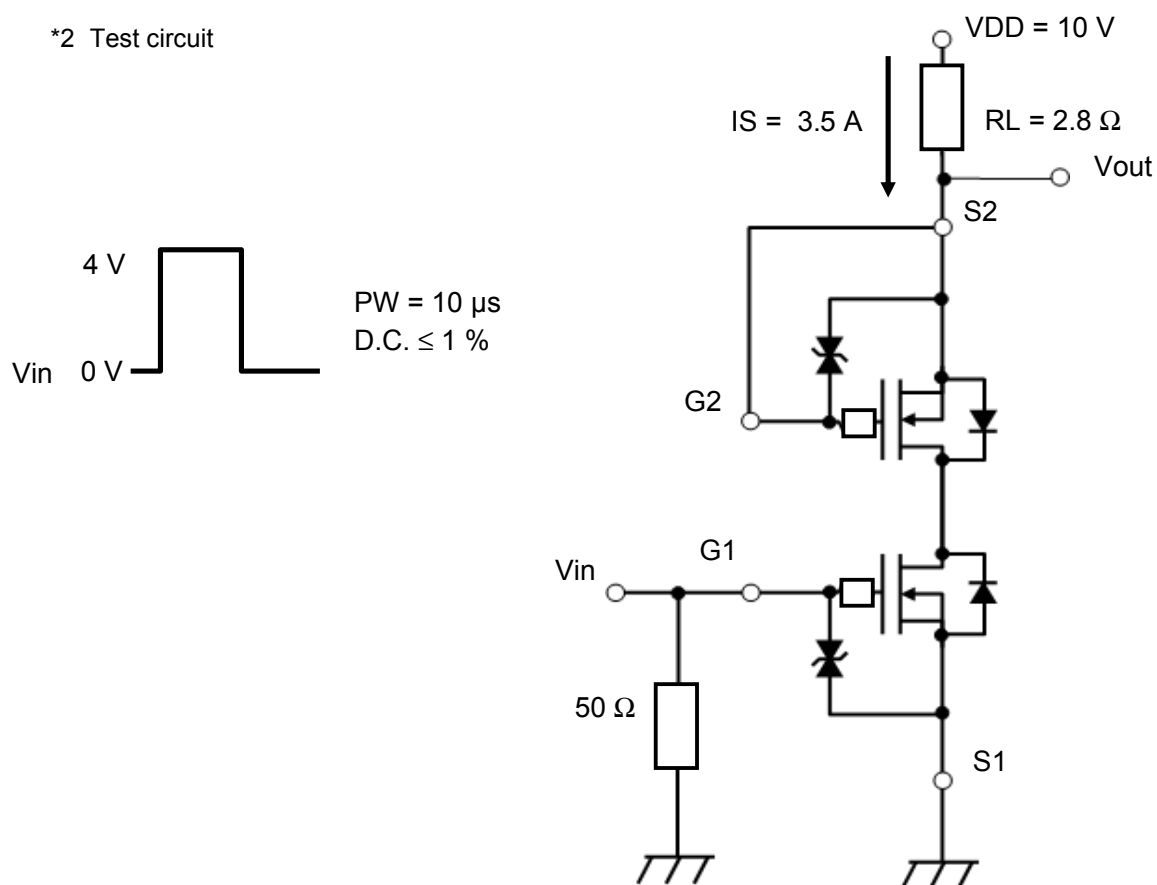
Ta = 25 °C,

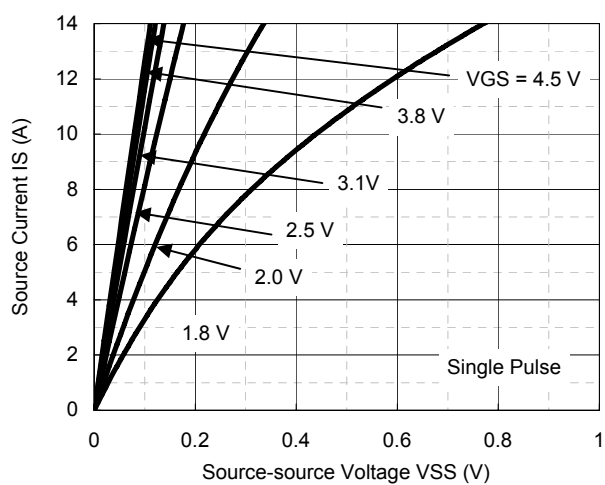
Mounted on FR4 board (25.4 × 25.4 × 1.0 mm)

Surface Mounted on FR4 Board using the minimum recommended

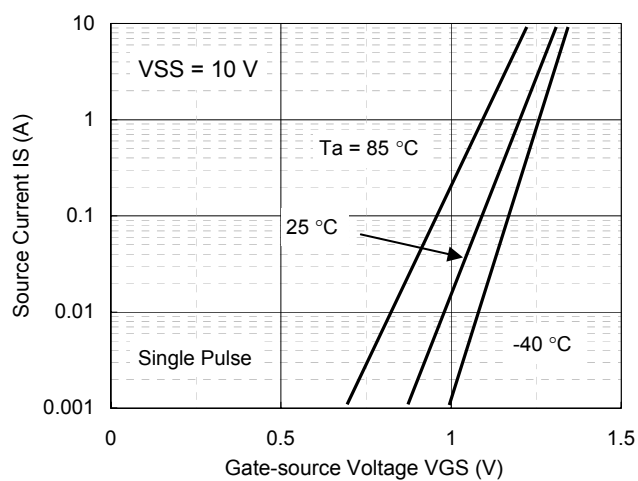
pad size (Cu area = 47 mm² including traces)

*2 Test circuit

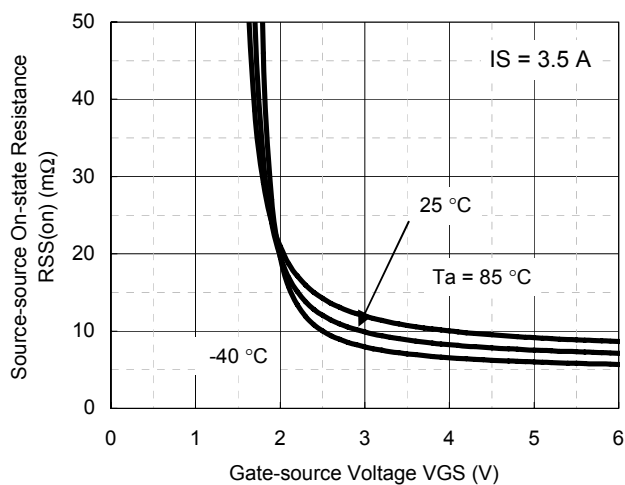




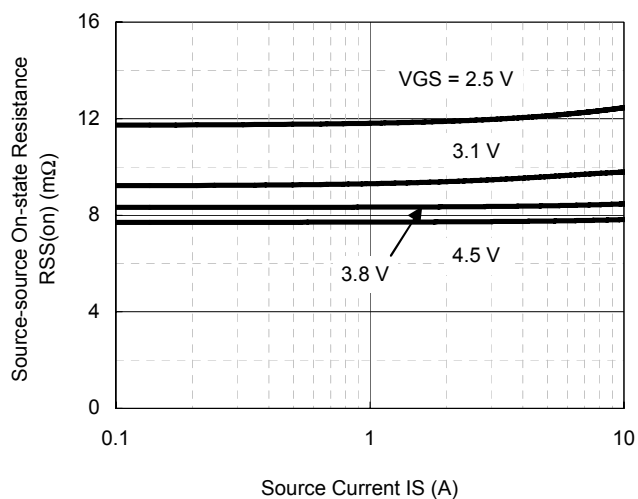
IS - VSS



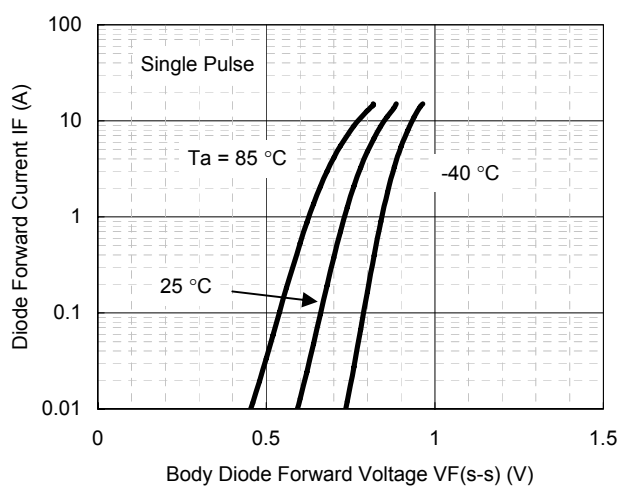
IS - VGS



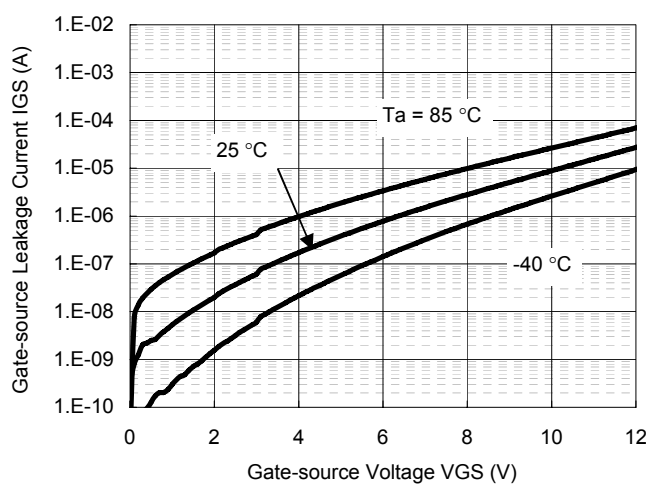
RSS(on) - VGS



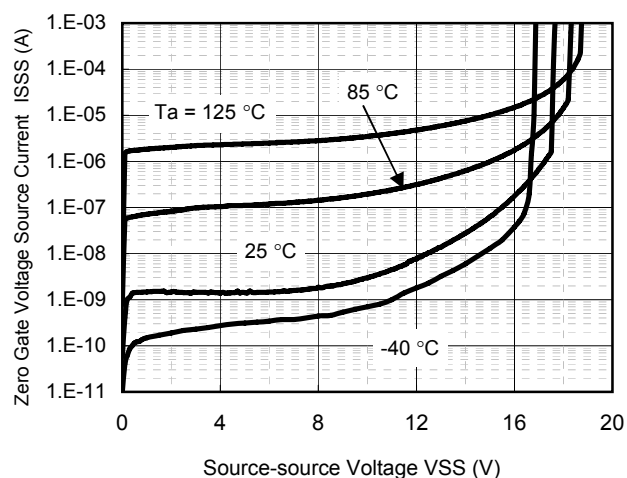
RSS(on) - IS



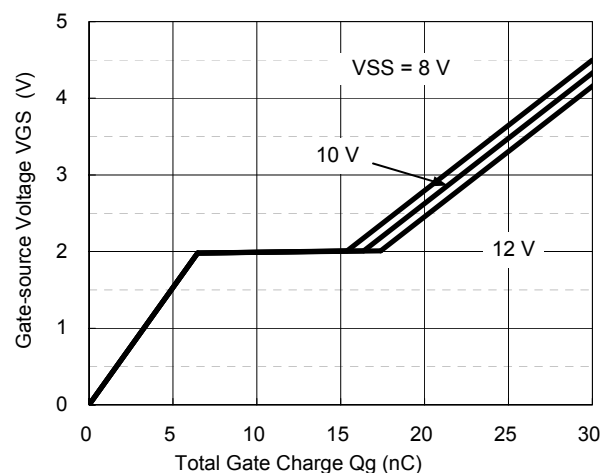
IF - VF(s-s)



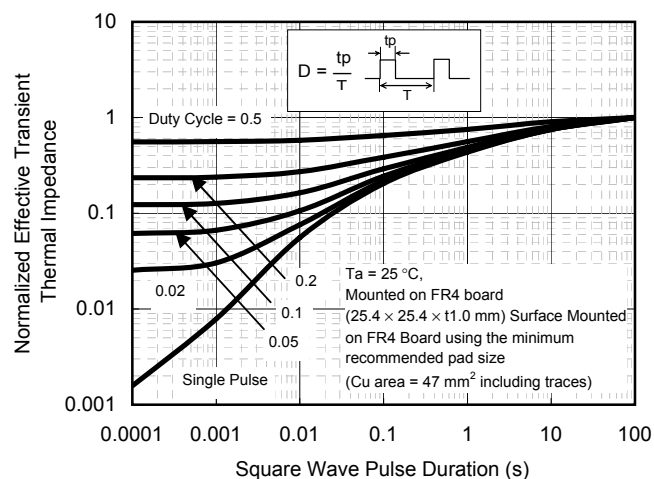
IGS - VGS



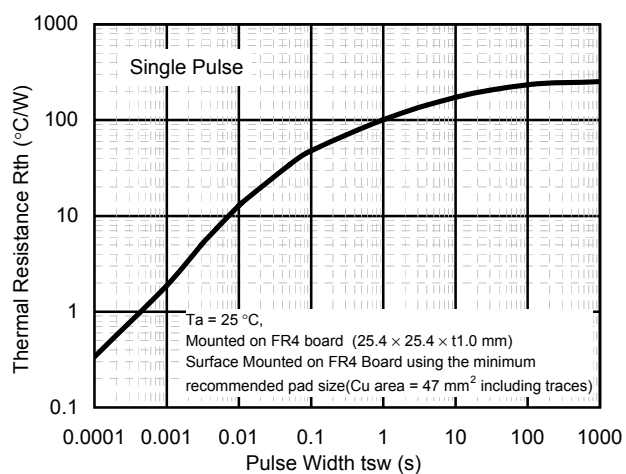
ISSS - VSS



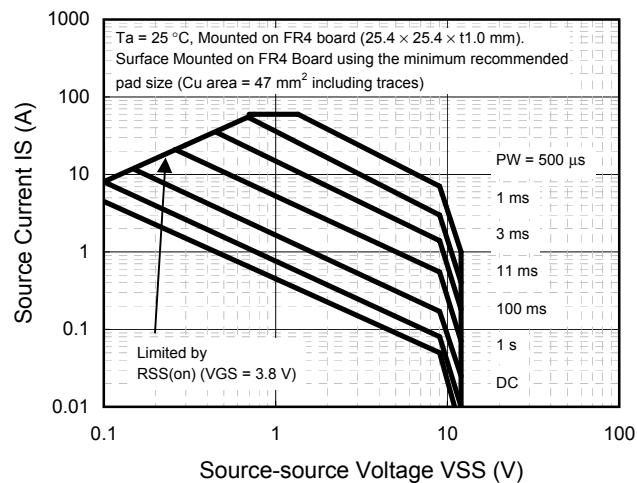
Dynamic Input/Output Characteristics



Thermal Response



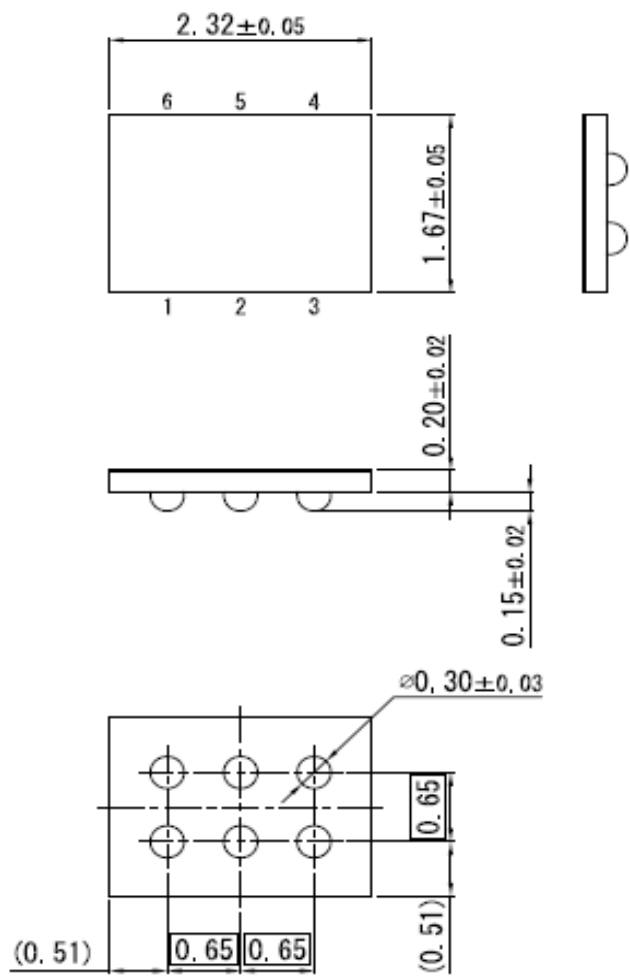
Rth - tsw



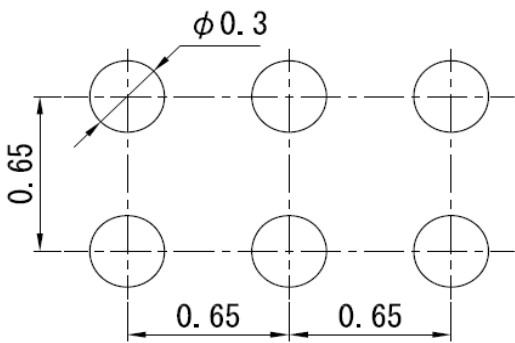
Safe Operating Area

MBGA006-W-1723APA

Unit: mm



Land Pattern (Reference) (Unit: mm)



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