

2MBI450U4N-170-50

IGBT Modules

IGBT MODULE (U series) 1700V / 450A / 2 in one package

■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as Welding machines



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at Tc=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage	V _{CES}		1700	V
Gate-Emitter voltage	V _{GES}		±20	V
Collector current	I _c	Continuous	Tc=25°C 600	A
			Tc=80°C 450	
	I _{cp}	1ms	Tc=25°C 1200	
			Tc=80°C 900	
	-I _c		450	
	-I _c pulse	1ms	900	
Collector power dissipation	P _c	1 device	2080	W
Junction temperature	T _j		150	°C
Storage temperature	T _{stg}		-40 to +125	
Isolation voltage	between terminal and copper base (*1)	AC : 1min.	3400	VAC
	between thermistor and others (*2)			
Screw torque	Mounting (*3)		3.5	N m
	Terminals (*4)		4.5	

Note *1: All terminals should be connected together when isolation test will be done.

Note *2: Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

Note *3: Recommendable value : Mounting : 2.5-3.5 Nm (M5) Note *4: Recommendable value : Terminals : 3.5-4.5 Nm (M6)

● Electrical characteristics (at Tj= 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1700V	-	-	3.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	600	nA
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 450mA	4.5	6.5	8.5	V
Collector-Emitter saturation voltage	V _{CE(sat)} (terminal)	V _{GE} = 15V	Tj=25°C	2.80	3.05	V
			Tj=125°C	3.20	-	
	V _{CE(sat)} (chip)	I _c = 450A	Tj=25°C	2.25	2.45	
			Tj=125°C	2.65	-	
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	42	-	nF
Turn-on time	t _{on}	V _{CC} = 900V I _c = 450A V _{GE} = ±15V R _G = 1.1Ω	-	0.62	1.20	μs
	t _r		-	0.39	0.60	
	t _{r(i)}		-	0.05	-	
Turn-off time	t _{off}		-	0.55	1.50	μs
	t _f		-	0.09	0.30	
Forward on voltage	V _F (terminal)	V _{GE} = 0V	Tj=25°C	2.25	2.55	V
			Tj=125°C	2.45	-	
	V _F (chip)	I _F = 450A	Tj=25°C	1.80	1.95	
			Tj=125°C	2.00	-	
Reverse recovery time	t _{rr}	I _F = 450A	-	0.18	0.6	μs
Lead resistance, terminal-chip (*5)	R _{lead}		-	1.00	-	mΩ
Resistance	R	T=25°C	-	5000	-	Ω
		T=100°C	465	495	520	
B value	B	T=25/50°C	3305	3375	3450	K

Note *5: Biggest internal terminal resistance among arm.

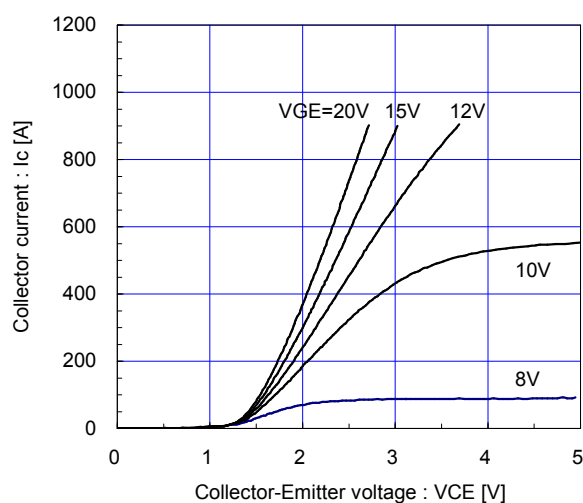
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT FWD	-	-	0.06	°C/W
Contact thermal resistance (1device) (*6)	R _{th(c-f)}	with Thermal Compound	-	0.0167	-	

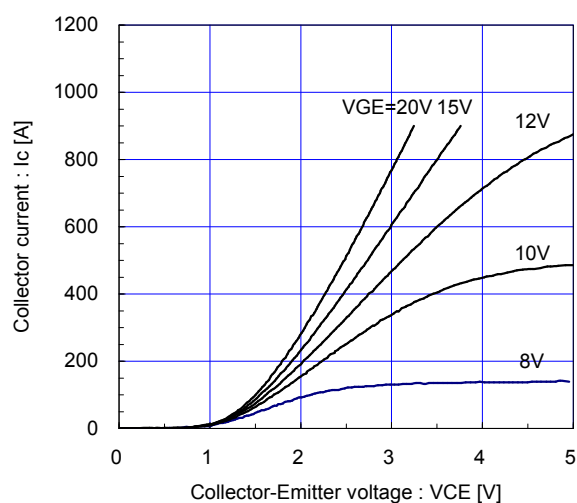
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

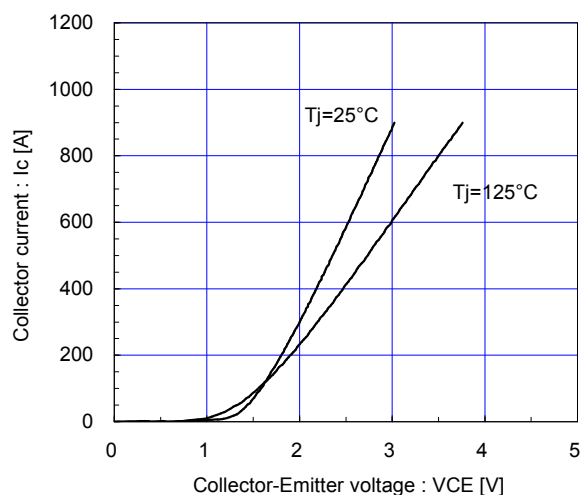
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

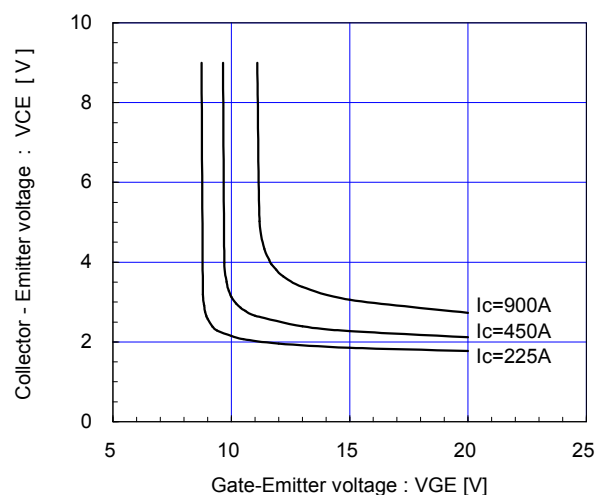
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 125^\circ\text{C}$ / chip

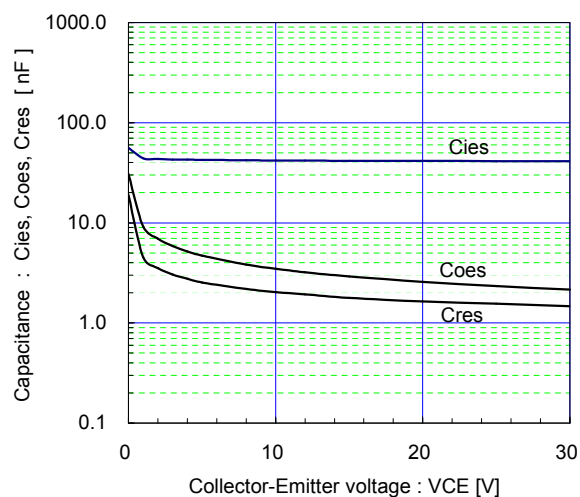
Collector current vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 15\text{V}$ / chip

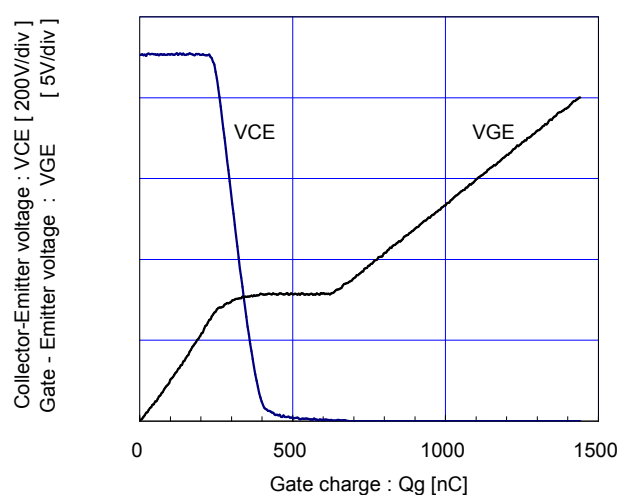
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$ / chip

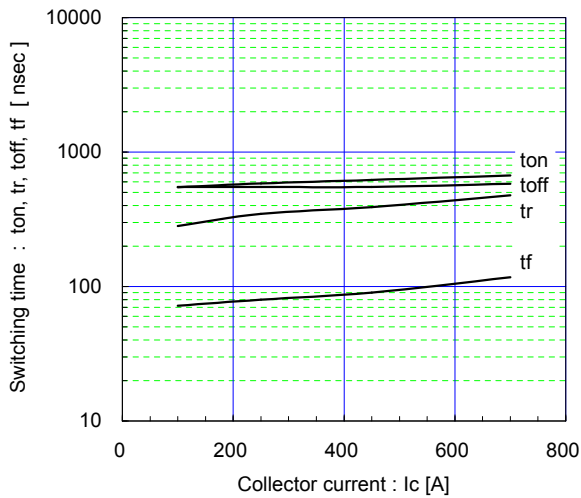
Capacitance vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$ 

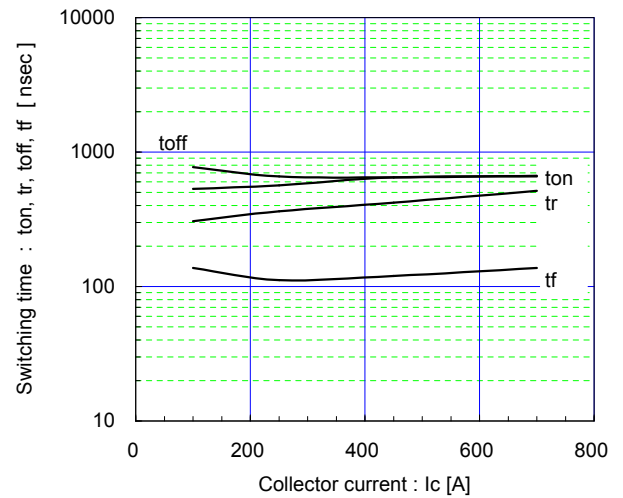
Dynamic Gate charge (typ.)

 $V_{CC} = 900\text{V}$, $I_c = 450\text{A}$, $T_j = 25^\circ\text{C}$ 

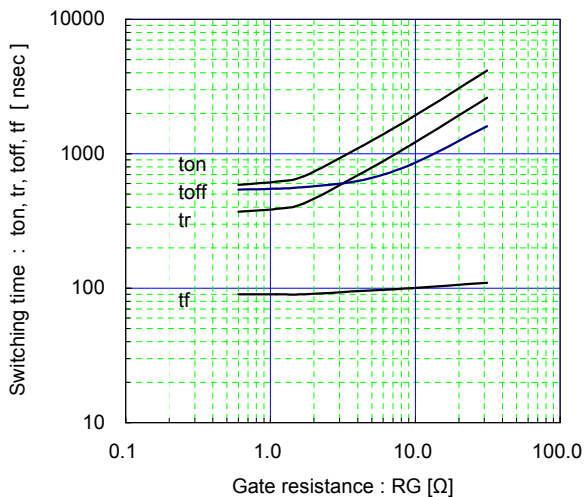
Switching time vs. Collector current (typ.)
 $V_{cc}=900V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$, $T_j=25^\circ C$



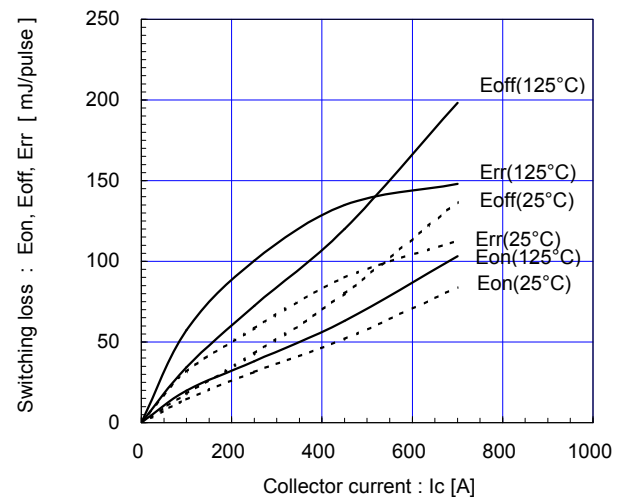
Switching time vs. Collector current (typ.)
 $V_{cc}=900V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$, $T_j=125^\circ C$



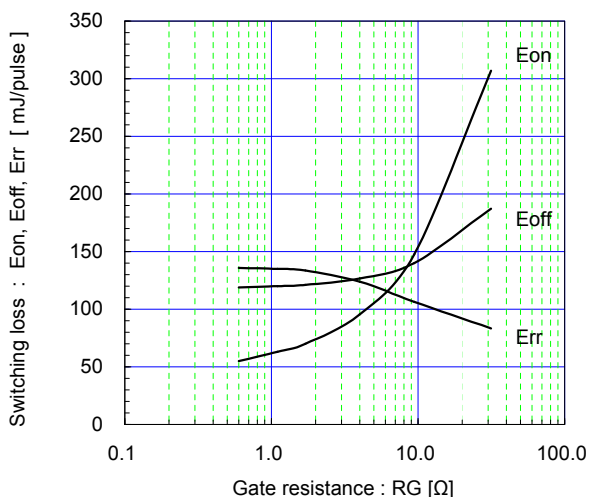
Switching time vs. Gate resistance (typ.)
 $V_{cc}=900V$, $I_c=450A$, $V_{GE}=\pm 15V$, $T_j=25^\circ C$



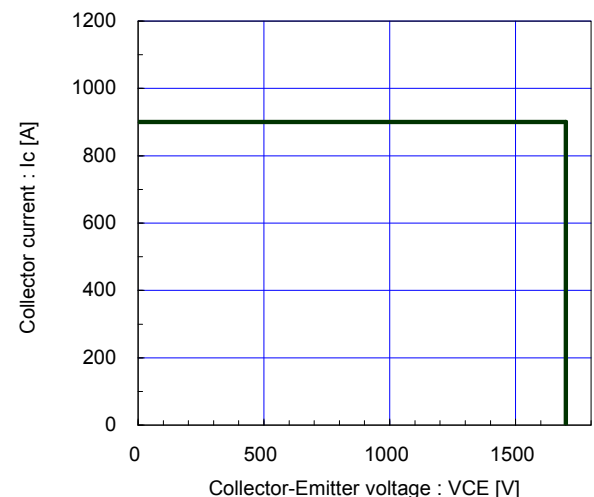
Switching loss vs. Collector current (typ.)
 $V_{cc}=900V$, $V_{GE}=\pm 15V$, $R_g=1.1\Omega$



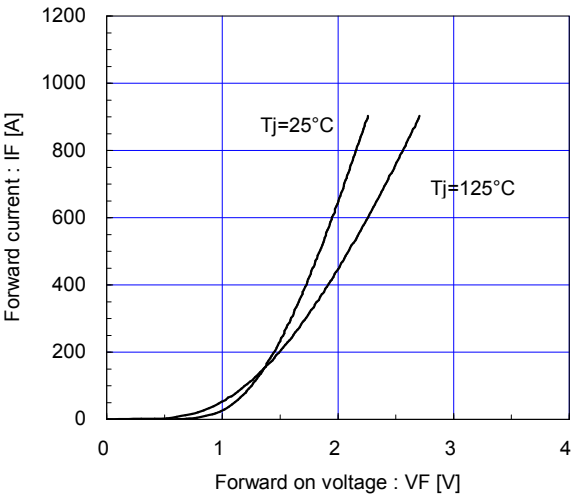
Switching loss vs. Gate resistance (typ.)
 $V_{cc}=900V$, $I_c=450A$, $V_{GE}=\pm 15V$, $T_j=125^\circ C$



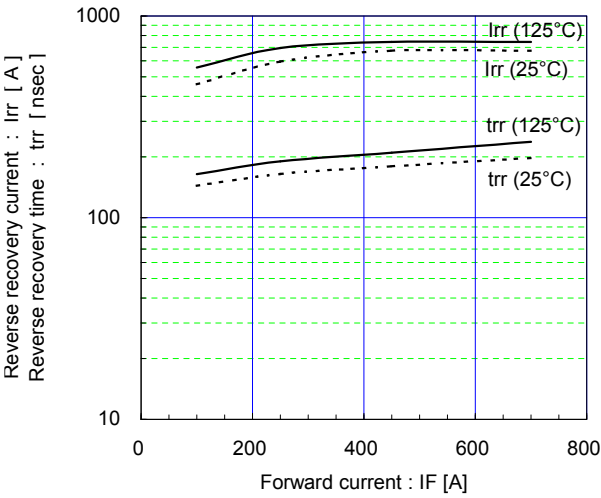
Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE} \leq 15V$, $R_g \geq 1.1\Omega$, $T_j \leq 125^\circ C$
 Stray inductance $\leq 100nH$



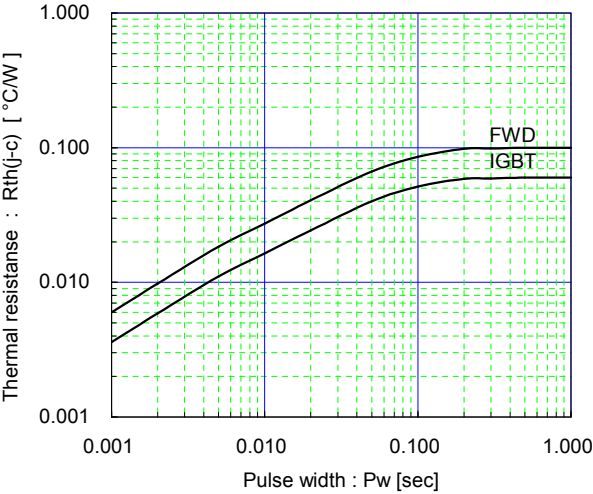
Forward current vs. Forward on voltage (typ.)
chip



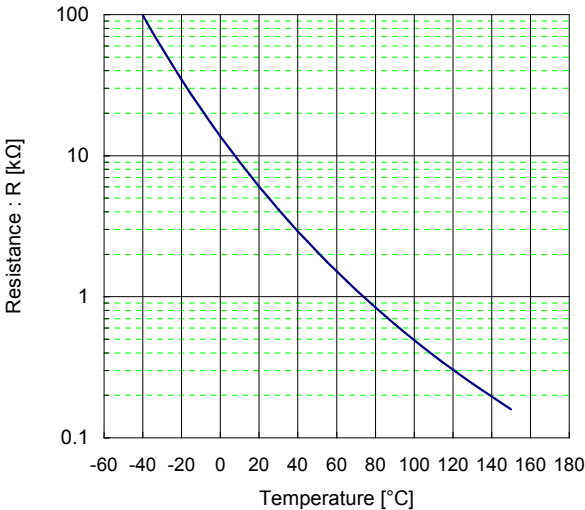
Reverse recovery characteristics (typ.)
Vcc=900V, VGE=±15V, Rg=1.1Ω



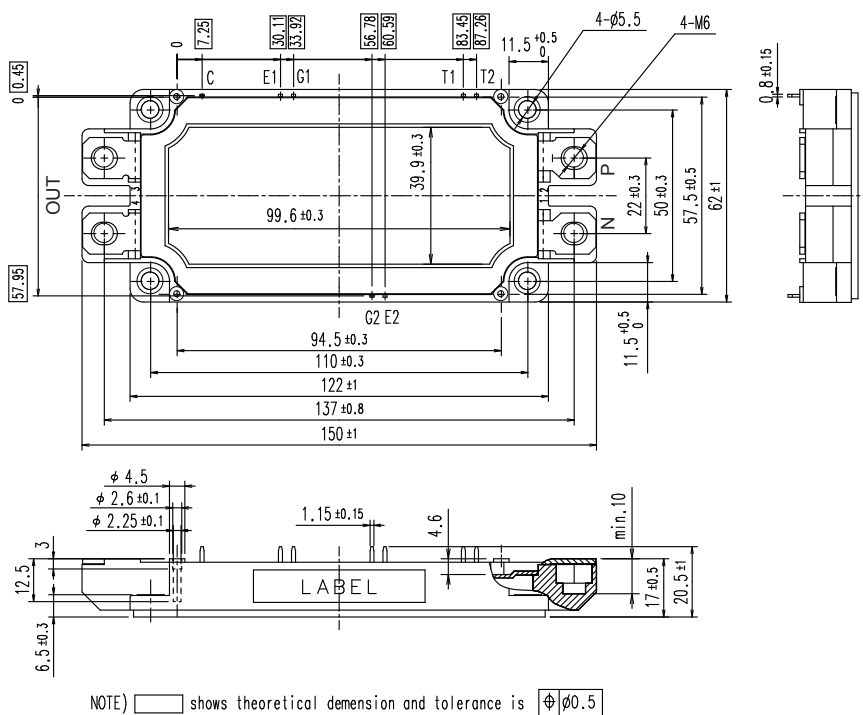
Transient thermal resistance (max.)



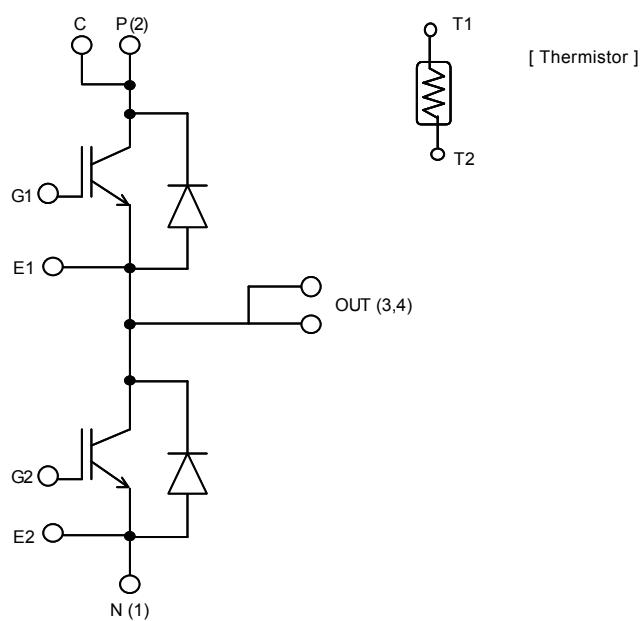
[Thermistor]
Temperature characteristic (typ.)



Outline Drawings, mm



Equivalent Circuit Schematic



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