

120V N-Channel Enhancement Mode MOSFET

Description

The AP200N12P/T uses advanced **APM-SGT** technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 120V$ (**Type: 135V**) $I_D = 200A$

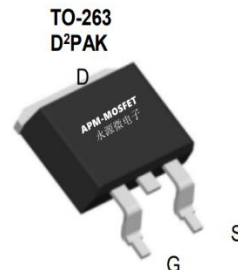
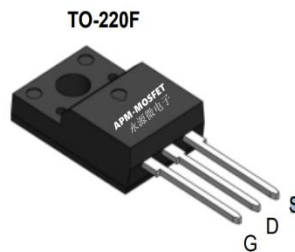
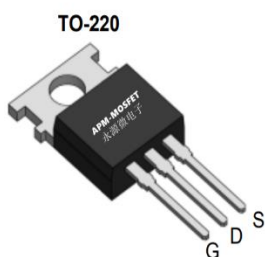
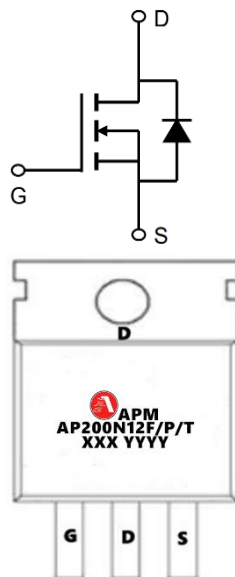
$R_{DS(ON)} < 3.8m\Omega$ @ $V_{GS}=10V$ (**Type: 2.9mΩ**)

Application

BMS

UPS

Power Management Switches



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP200N12F	TO-220F-3L	AP200N12F XXX YYYY	1000
AP200N12P	TO-220-3L	AP200N12P XXX YYYY	1000
AP200N12T	TO-263-3L	AP200N12T XXX YYYY	800

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	120	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	200	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	150	A
I_{DM}	Pulsed Drain Current	600	A
E_{AS}	Single Pulse Avalanche Energy	530	mJ
I_{AS}	Avalanche Current	45	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	240	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	0.75	°C/W

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Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Type	Max.	Unit
VDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	120	135	-	V
IGSS	Gate-body Leakage current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
IDSS	Zero Gate Voltage Drain Current $T_J=25^{\circ}\text{C}$	$V_{DS}=120V, V_{GS}=0V$	-	-	1	μA
IDSS	Zero Gate Voltage Drain Current $T_J=100^{\circ}\text{C}$		-	-	100	
VGS(th)	Gate-Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.9	4.0	V
RDS(on)	Drain-Source on-Resistance ²	$V_{GS}=10V, I_D=20A$	-	2.9	3.8	m Ω
RDS(on)	Drain-Source on-Resistance ²	$V_{GS}=6V, I_D=20A$		3.8	5.8	m Ω
Ciss	Input Capacitance	$V_{DS}=60V, V_{GS}=0V, f=1\text{MHz}$	-	5240	-	pF
Coss	Output Capacitance		-	739	-	
Crss	Reverse Transfer Capacitance		-	12	-	
R _g	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	-	1.7	-	Ω
Q _g	Total Gate Charge	$V_{DD}=60V, I_D=45A, V_{GS}=0 \text{ to } 10V$	-	19	-	nC
Q _{gs}	Gate-Source Charge		-	11	-	
Q _{gd}	Gate-Drain Charge		-	75	-	
td(on)	Turn-on Delay Time	$V_{DD}=60V, V_{GS}=10V, I_D=45A, R_G=10\Omega$	-	59	-	ns
t _r	Rise Time		-	41	-	
td(off)	Turn-off Delay Time		-	96	-	
t _f	Fall Time		-	33	-	
VSD	Diode Forward Voltage ²	$I_F=20A, V_{GS}=0V$	-	0.8	1.2	V
IS	Continuous Source Current ^{1,5}	$V_G=V_D=0V, \text{ Force Current}$	-	-	200	A
trr	Body Diode Reverse Recovery Time	$V_R=60V, I_F=35A, dI/dt=100A/\mu s$	-	70	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	200	-	nC

Notes:

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The EAS data shows Max. rating . The test condition is $V_{DD}=50V, V_{GS}=10V, L=0.5mH, I_{AS}=45A$
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

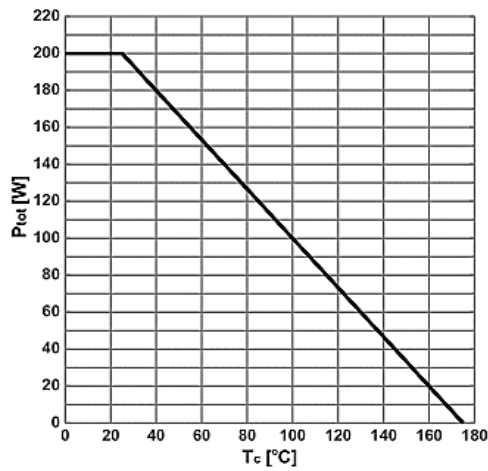


Figure 1. Power dissipation

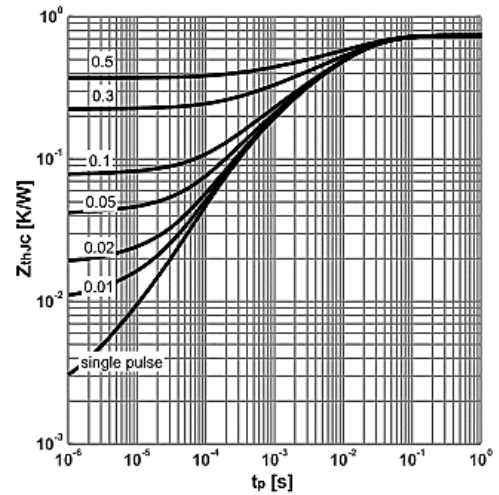


Figure 2. Max. transient thermal impedance

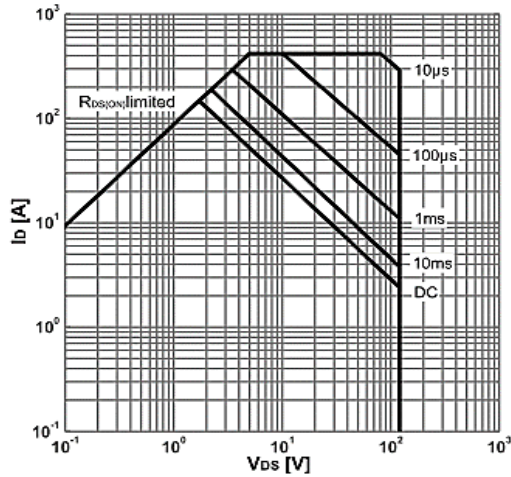


Figure 3. Safe operating area

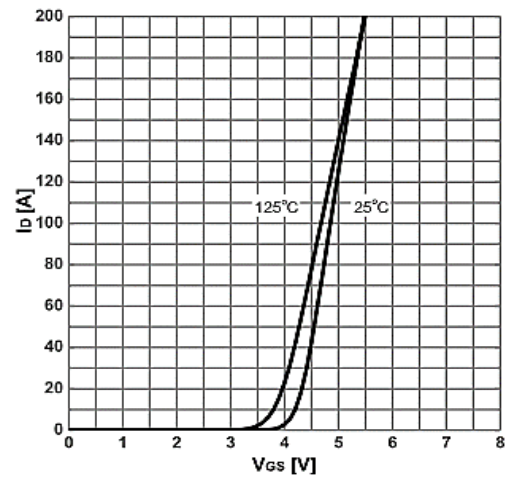


Figure 4. Type. transfer characteristics

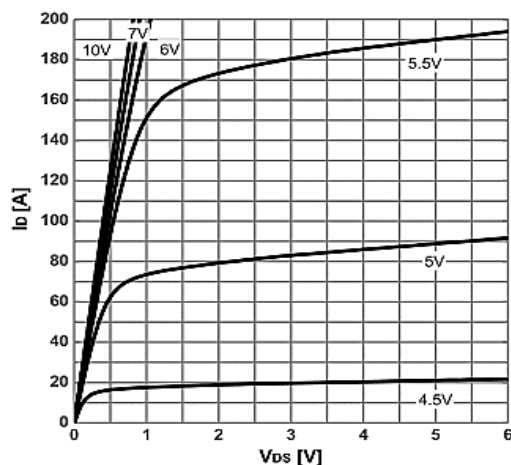


Figure 5. Typ. output characteristics(T_j 25°C)

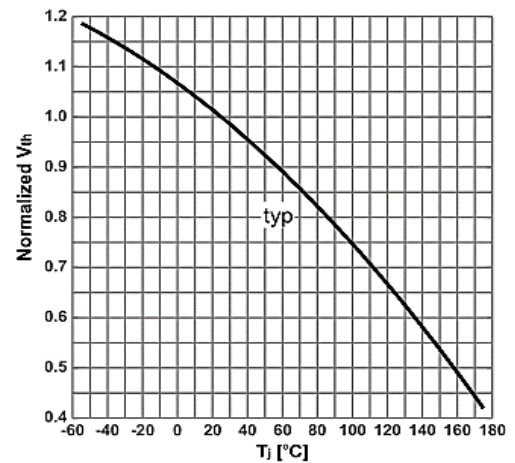


Figure 6. Typ. output characteristics(T_j 125°C)

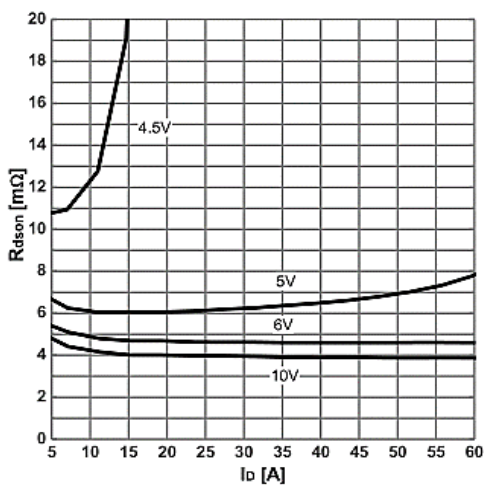


Figure 7. On-state resistance vs. Drain current

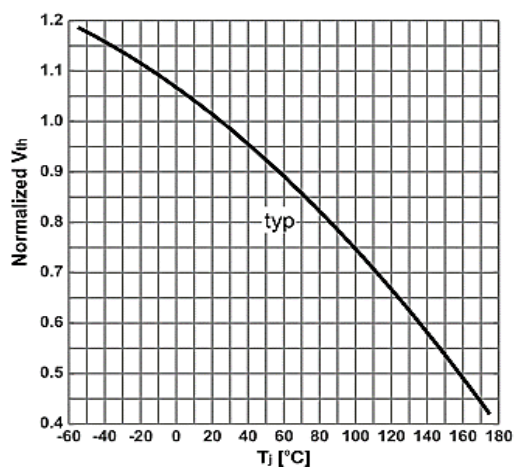


Figure 6. Gate threshold voltage vs. Junction Temperature

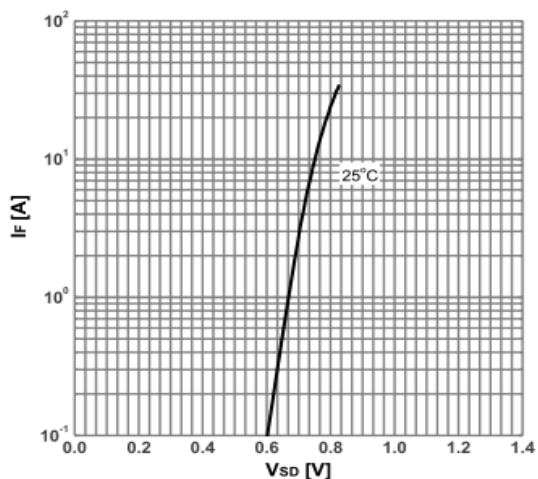


Figure 9. Forward characteristics of reverse diode

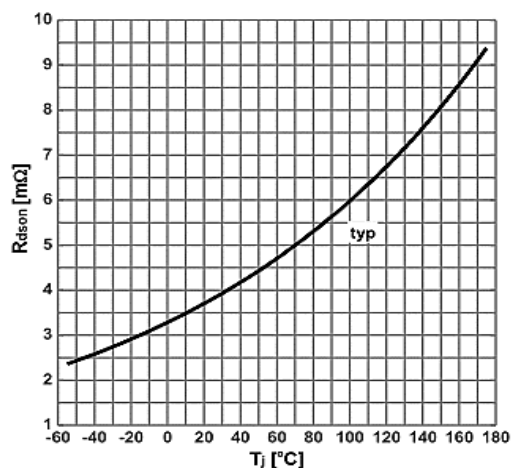


Figure 8. On-state resistance vs. Junction temperature

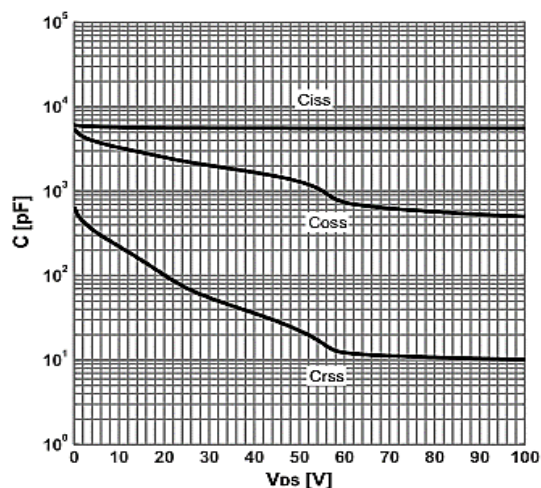


Figure9 Typ. capacitances

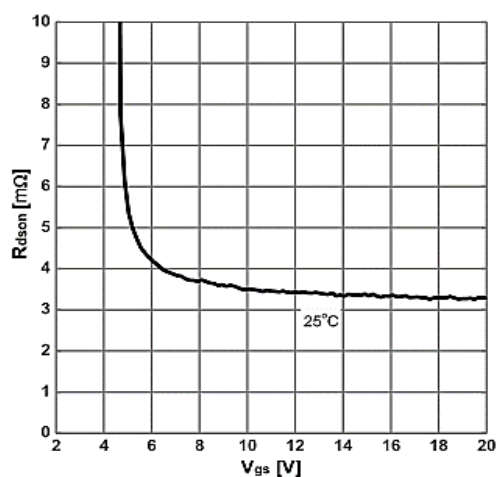


Figure11. On-state resistance vs. Vgs characteristics

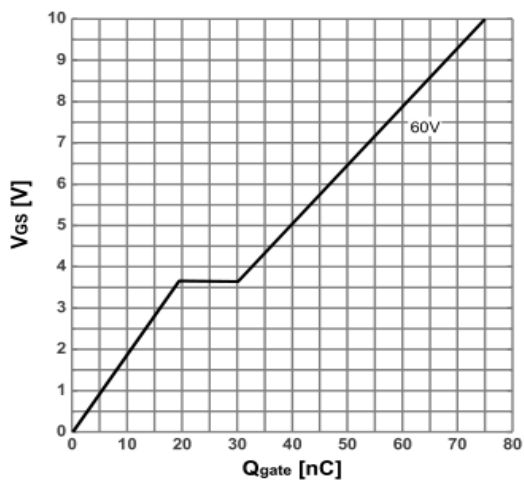
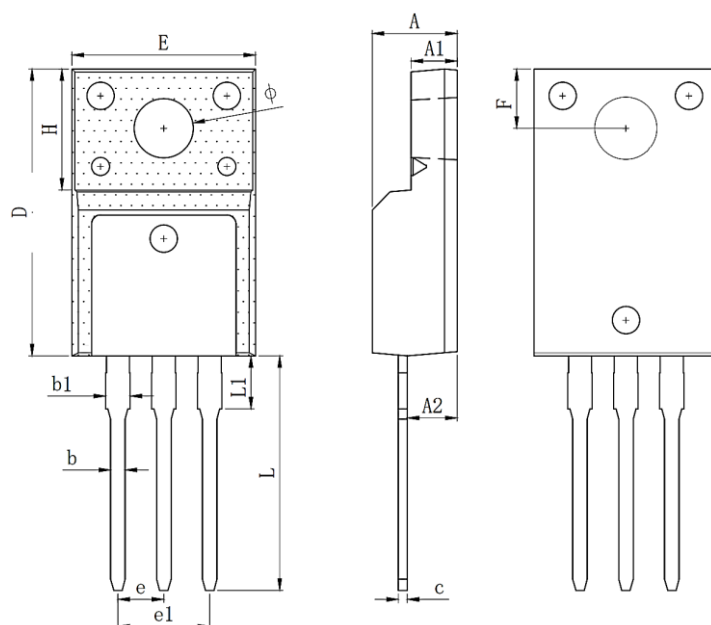


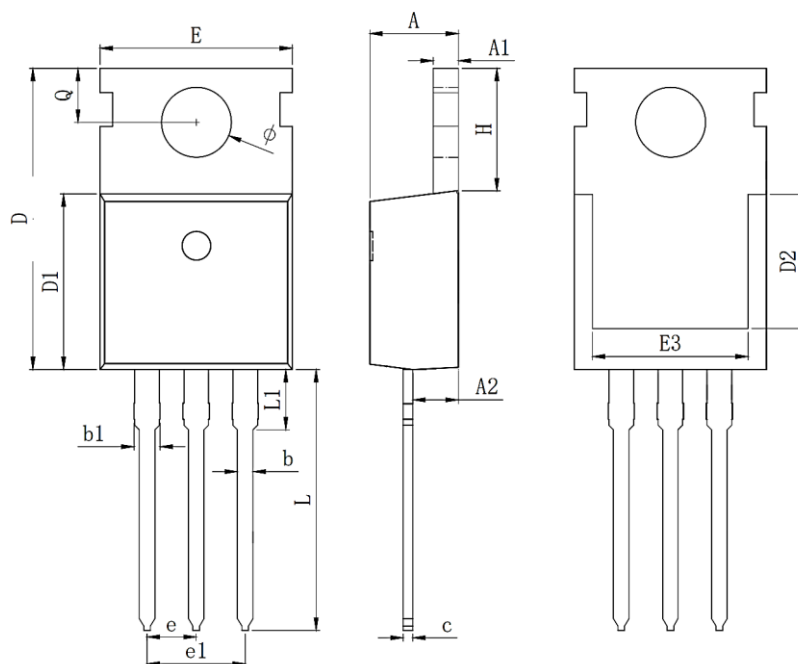
Figure 13: Typ. gate charge

Package Mechanical Data:TO-220F-3L



Symbol	Dim in mm		
	Min	Typ	Max
A	4.5	4.7	5.0
A1	2.34	2.54	2.84
A2	2.4	2.9	3.4
b	0.7	0.8	0.95
b1	1.05	1.35	1.55
c	0.4	0.5	0.65
D	15.57	15.87	16.17
H	6.7REF		
E	9.86	10.16	10.46
e	2.54BSC		
e1	5.08BSC		
L	12.65	12.98	13.3
L1	2.78	3.08	3.38
F	3.15	3.3	3.55
φ	3	3.3	3.65

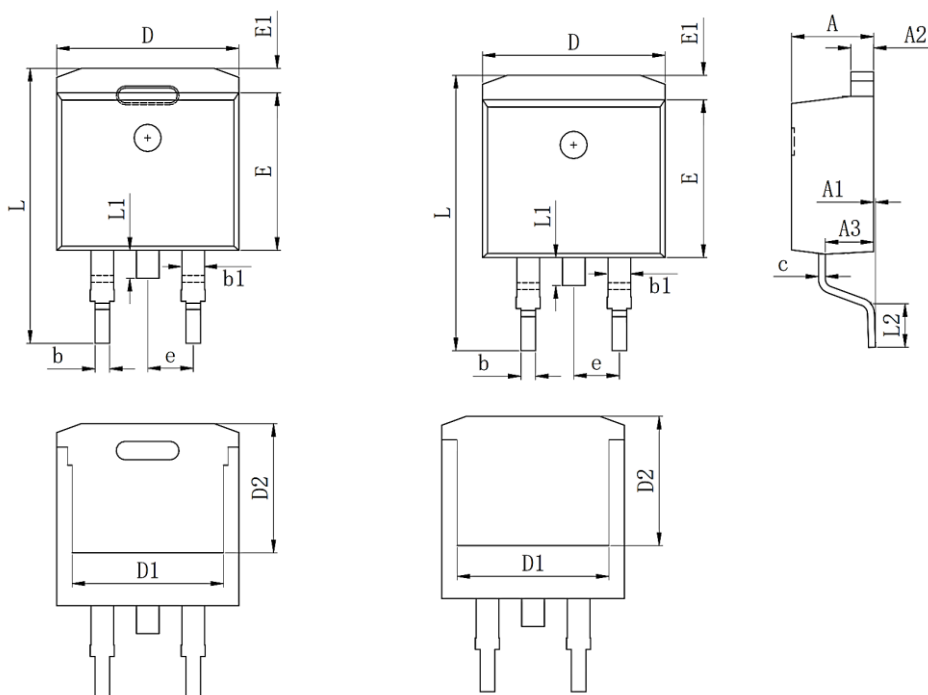
Package Mechanical Data:TO-220C-3L



Symbol	Dim in mm		
	Min	Typ	Max
A	4.25	4.5	4.7
A1	1.15	1.3	1.45
A2	2.15	2.35	2.55
b	0.65	0.8	0.95
b1	1.15	1.35	1.55
c	0.35	0.5	0.65
D	14.3	15.3	16.3
D1	8.8	9.1	9.4
D2	6.3REF		
E	9.7	10	10.3
E3	7	8	9
e	2.54BSC		
e1	5.08BSC		
L	12.7	13.5	13.9
L1		3.1	3.4
H	6	6.5	6.85
Q	2.6	2.8	3
φ	3.4	3.6	3.8



Package Mechanical Data:TO-263C-3L



Symbol	Dim in mm		
	Min	Typ	Max
A	4.37	4.57	4.77
A1	0		0.25
A2	1.22	1.27	1.42
A3	2.49	2.69	2.89
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D	9.86	10.16	10.36
D1	8.4REF		
D2	7.073REF		
E	8.5	8.7	8.9
E1	1.07	1.27	1.47
e	2.54BSC		
L	17.7	15.1	15.5
L1	1.4	1.55	1.7
L2	2	2.3	2.6
H	6	6.5	6.85
Q	2.6	2.8	3
φ	3.4	3.6	3.8

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Edition	Date	Change
REV1.0	2021/8/5	Initial release
REV1.1	2023/3/4	Reduce RDS (on)

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