

# NTA4151P, NTE4151P

## MOSFET – Single, P-Channel, Small Signal, Gate Zener, SC-75, SC-89

**-20 V, -760 mA**

### Features

- Low  $R_{DS(on)}$  for Higher Efficiency and Longer Battery Life
- Small Outline Package (1.6 x 1.6 mm)
- SC-75 Standard Gullwing Package
- ESD Protected Gate
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- High Side Load Switch
- DC-DC Conversion
- Small Drive Circuits
- Battery Operated Systems such as Cell Phones, PDAs, Digital Cameras, etc.

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter		Symbol	Value	Units
Drain-to-Source Voltage		$V_{DS}$	-20	V
Gate-to-Source Voltage		$V_{GS}$	$\pm 6.0$	V
Continuous Drain Current (Note 1)	Steady State	$I_D$	-760	mA
Power Dissipation (Note 1)	Steady State	$P_D$	301	mW
SC-75			313	
SC-89				
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	$\pm 1000$	mA
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$
Continuous Source Current (Body Diode)		$I_S$	-250	mA
Lead Temperature for Soldering Purposes (1/8 in from case for 10 s)		$T_L$	260	$^\circ\text{C}$
Gate-to-Source ESD Rating – (Human Body Model, Method 3015)		ESD	1800	V

### THERMAL RESISTANCE RATINGS

Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$		$^\circ\text{C/W}$
SC-75		415	
SC-89		400	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

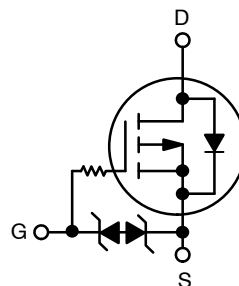


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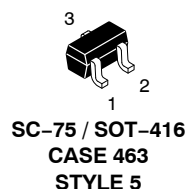
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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ MAX
-20 V	0.26 $\Omega$ @ -4.5 V	-760 mA
	0.35 $\Omega$ @ -2.5 V	
	0.49 $\Omega$ @ -1.8 V	

### P-Channel MOSFET



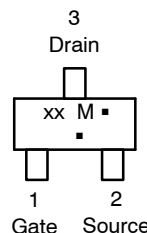
### MARKING DIAGRAM & PIN ASSIGNMENT



SC-75 / SOT-416  
CASE 463  
STYLE 5



SC-89  
CASE 463C



xx = Device Code  
M = Date Code\*  
■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# NTA4151P, NTE4151P

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$		-1.0	-100	nA
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$		$\pm 1.0$	$\pm 10$	$\mu\text{A}$

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.45		-1.2	V
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -350\text{ mA}$		0.26	0.36	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -300\text{ mA}$		0.35	0.45	
		$V_{GS} = -1.8\text{ V}, I_D = -150\text{ mA}$		0.49	1.0	
Forward Transconductance	$g_{FS}$	$V_{DS} = -10\text{ V}, I_D = -250\text{ mA}$		0.4		S

### CHARGES AND CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -5.0\text{ V}$		156		pF
Output Capacitance	$C_{OSS}$			28		
Reverse Transfer Capacitance	$C_{RSS}$			18		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DD} = -10\text{ V}, I_D = -0.3\text{ A}$		2.1		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.125		
Gate-to-Source Charge	$Q_{GS}$			0.325		
Gate-to-Drain Charge	$Q_{GD}$			0.5		

### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5\text{ V}, V_{DD} = -10\text{ V}, I_D = -200\text{ mA}, R_G = 10\text{ }\Omega$		8.0		ns
Rise Time	$t_r$			8.2		
Turn-Off Delay Time	$t_{d(OFF)}$			29		
Fall Time	$t_f$			20.4		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -250\text{ mA}$		-0.72	-1.1	V
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Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

3. Switching characteristics are independent of operating junction temperatures.

## ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
NTA4151PT1G	TN	SC-75 (Pb-Free)	3000 / Tape & Reel
NTE4151PT1G	TM	SC-89 (Pb-Free)	3000 / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

TYPICAL ELECTRICAL CHARACTERISTICS

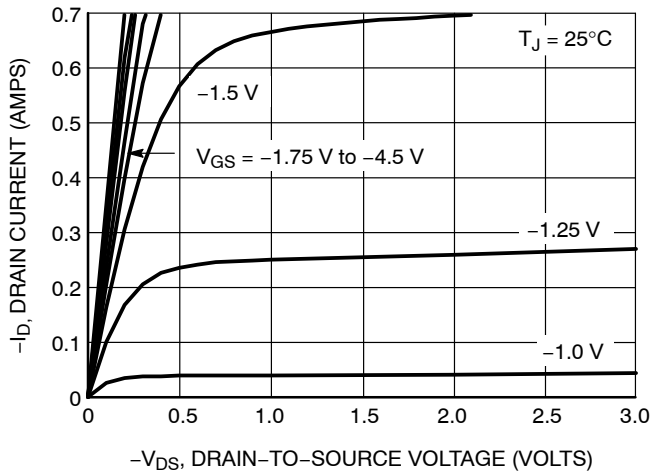


Figure 1. On-Region Characteristics

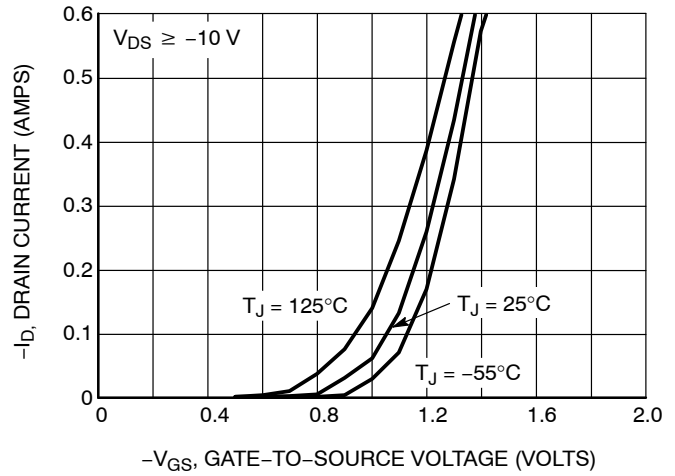


Figure 2. Transfer Characteristics

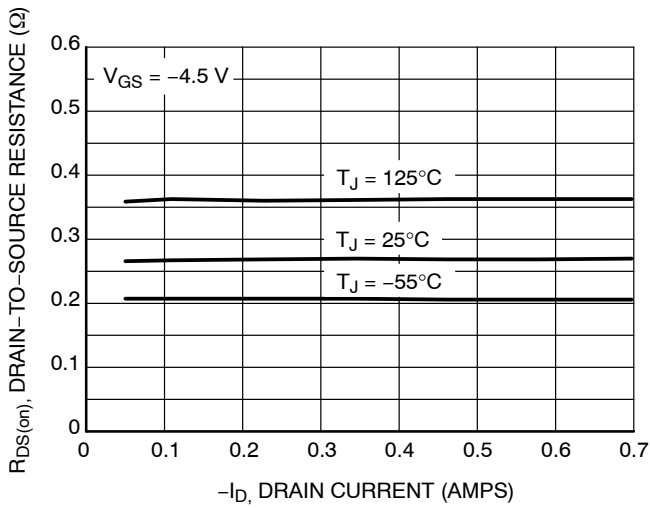


Figure 3. On-Resistance vs. Drain Current and Temperature

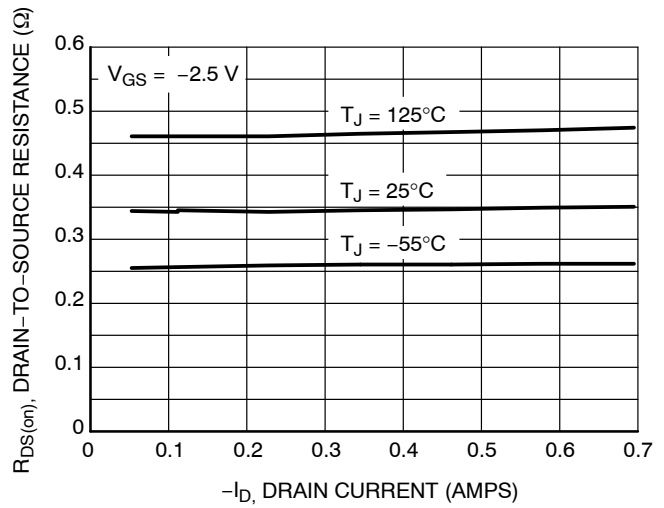


Figure 4. On-Resistance vs. Drain Current and Temperature

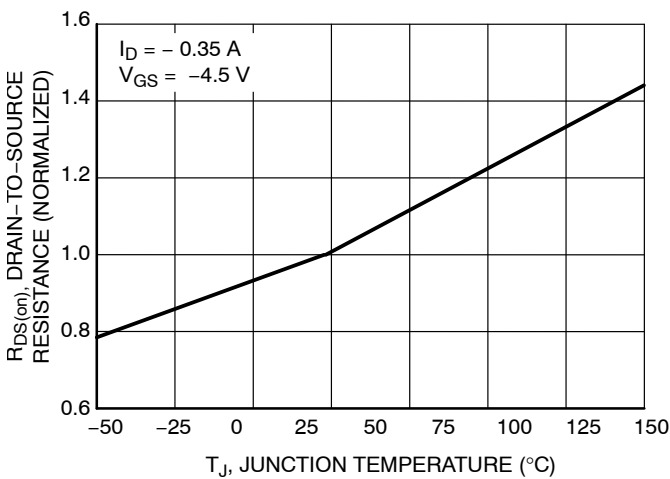


Figure 5. On-Resistance Variation with Temperature

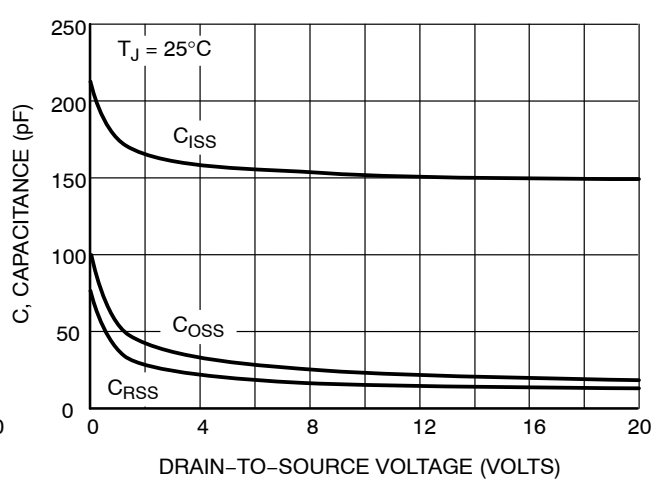
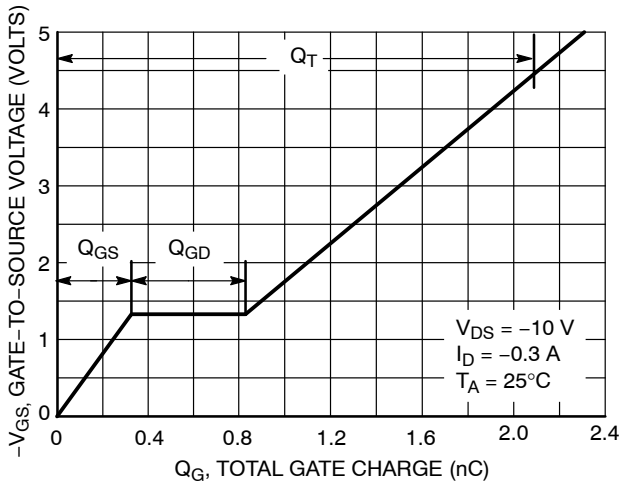


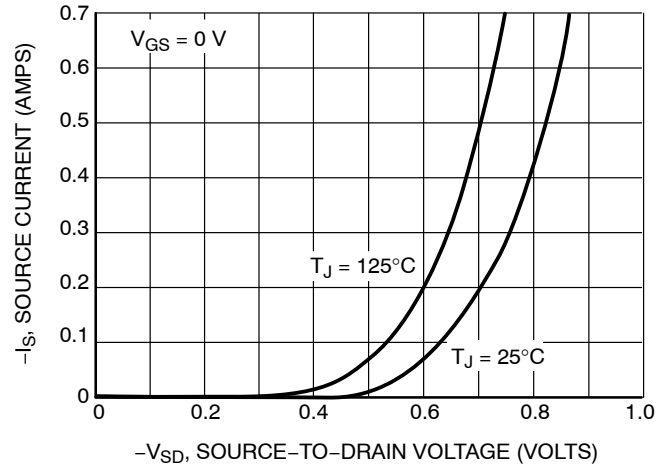
Figure 6. Capacitance Variation

# NTA4151P, NTE4151P

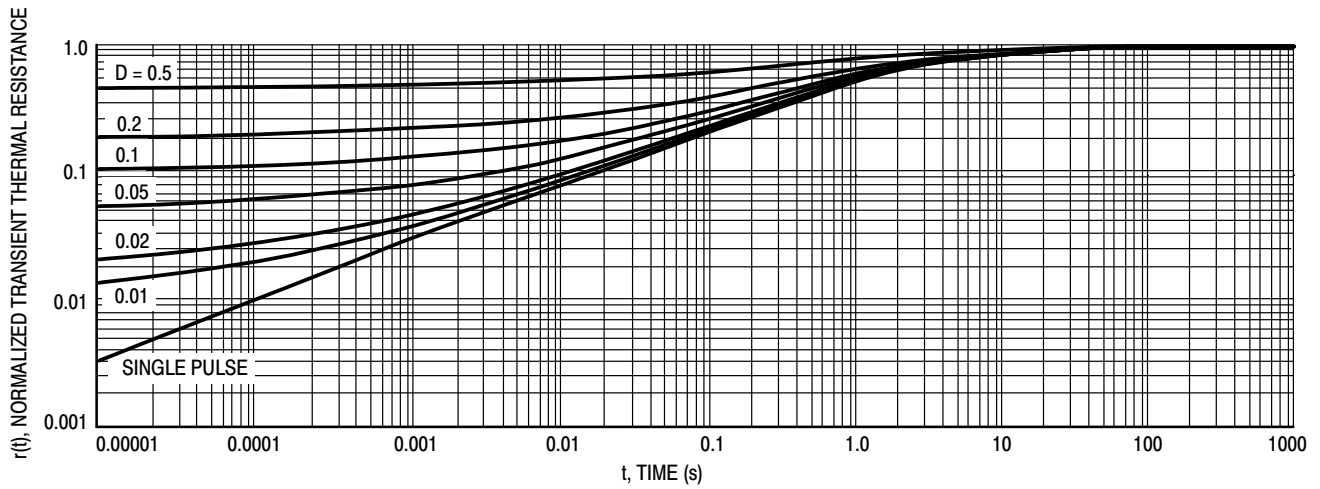
## TYPICAL ELECTRICAL CHARACTERISTICS



**Figure 7. Gate-to-Source Voltage vs. Total Gate Charge**



**Figure 8. Diode Forward Voltage vs. Current**



**Figure 9. Normalized Thermal Response**



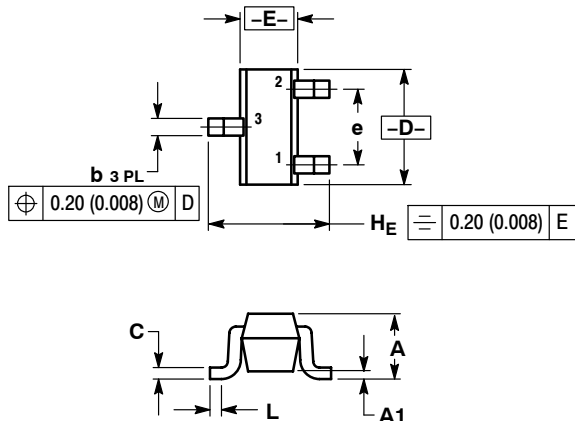
SCALE 4:1

### SC-75/SOT-416

#### CASE 463-01

#### ISSUE G

DATE 07 AUG 2015



STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

STYLE 3:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

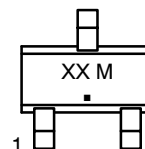
STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 5:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.027	0.031	0.035
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.15	0.20	0.30	0.006	0.008	0.012
C	0.10	0.15	0.25	0.004	0.006	0.010
D	1.55	1.60	1.65	0.061	0.063	0.065
E	0.70	0.80	0.90	0.027	0.031	0.035
e	1.00 BSC			0.04 BSC		
L	0.10	0.15	0.20	0.004	0.006	0.008
H <sub>E</sub>	1.50	1.60	1.70	0.060	0.063	0.067

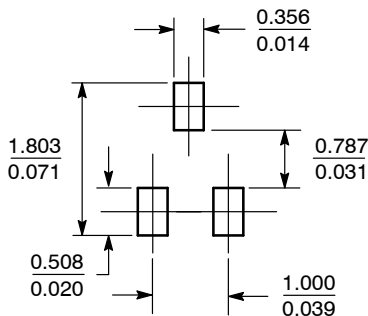
### GENERIC MARKING DIAGRAM\*



XX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

### SOLDERING FOOTPRINT\*



SCALE 10:1 (mm/inches)

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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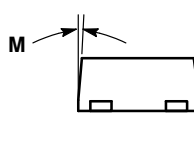
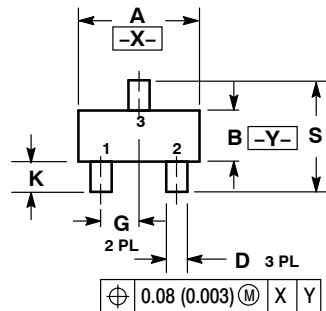


### SC-89, 3 LEAD CASE 463C-03 ISSUE C

DATE 31 JUL 2003



SCALE 4:1

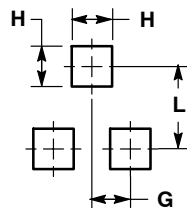


STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

STYLE 3:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE



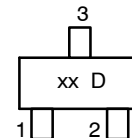
RECOMMENDED PATTERN  
OF SOLDER PADS

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10	---	---	10
N	---	---	10	---	---	10
S	1.50	1.60	1.70	0.059	0.063	0.067

#### GENERIC MARKING DIAGRAM\*




xx = Specific Device Code  
D = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking.

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