

# **DATA SHEET**

**ARRAY CHIP RESISTORS** 

YC/TC

5%, 1%

sizes

YC:102/104/122/124/162/164/248/324/158T/358L/358T

TC: 122/124/164

**RoHS** compliant



YAGEO Phícomp



#### SCOPE

This specification describes YC (convex, flat) and TC (concave) series chip resistor arrays with lead-free terminations made by thick film process.

#### **APPLICATIONS**

- Terminal for SDRAM and DDRAM
- Computer applications: laptop computer, desktop computer
- Consume electronic equipments: PDAs, PNDs
- Mobile phone, telecom...

### **FEATURES**

- More efficient in pick & place application
- · Low assembly costs
- · RoHS compliant
- Products with lead free terminations meet RoHS requirements
- Pb-glass contained in electrodes
- Resistor element and glass are exempted by RoHS
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Saving of PCB space
- None forbidden-materials used in products/production
- Halogen Free Epoxy

#### ORDERING INFORMATION - GLOBAL PART NUMBER & 12NC

Both part numbers are identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

#### YAGEO BRAND ordering code

#### **GLOBAL PART NUMBER (PREFERSRED)**

## (I) SIZE

YC:102/104/122/124/162/164/248/324/158T/358L/358T

TC: 122/124/164

## (2) ARRAYS OR NETWORKS

Array YC102/104/122/124/162/164/248/324: -Network YC158T/YC358L/YC358T: NA

# (3) TOLERANCE

#### (4) PACKAGING TYPE

R = Paper taping reel K = Embossed plastic tape reel

# (5) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Base on spec

# (6) TAPING REEL

07 = 7 inch dia. Reel 13 = 13 inch dia. Reel

# (7) RESISTANCE VALUE

There are 2~4 digits indicated the resistor value. Letter R/K/M is decimal point. Detailed resistance rules show in table of "Resistance rule of global part number".

#### (8) DEFAULT CODE

Letter L is the system default code for ordering only. (Note)
Letter T is the only default code for YCI02.

#### ORDERING EXAMPLE

The ordering code of a YC122 convex chip resistor array, value 1,000  $\Omega$  with ±5% tolerance, supplied in 7-inch tape reel is: YC122-JR-071KL.

YC158T network, value  $100,000\Omega$  with 5% tolerance, supplied in 7-inch tape reel is: YC158TJR-07100KL

#### NOTE

- All our RSMD products meet RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)

#### Resistance rule of global part number Resistance code rule Example 0R 0R = Jumper $IR = I \Omega$ XRXX $IR5 = 1.5 \Omega$ (1 to 9.76 $\Omega$ ) $9R76 = 9.76 \Omega$ XXRX $IOR = IO \Omega$ (10 to 97.6 $\Omega$ ) $97R6 = 97.6 \Omega$ XXXR $100R = 100 \Omega$ (100 to 976 $\Omega$ ) XKXX $IK = 1,000 \Omega$ (I to 9.76 K $\Omega$ ) $9K76 = 9760 \Omega$ ΧM $IM = 1,000,000 \Omega$ $(I M\Omega)$

Product specification

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## **PHYCOMP BRAND** ordering codes

Both GLOBAL PART NUMBER (preferred) and 12NC (traditional) codes are acceptable to order Phycomp brand products.

# **GLOBAL PART NUMBER (PREFERRED)**

For detailed information of GLOBAL PART NUMBER and ordering example, please refer to page 2. TC122 series is supplied and ordered by global part number only.

#### 12NC CODE

<b>235</b> (I)	0	(2) (3) (4)			
TYPE/ 2×0402	START IN <sup>(1)</sup>	TOL. (%)	resistance range	PAPER / PE TAPE ON R	EEL (units) <sup>(2)</sup> 50,000
ARV321	2350	±5%	l to l MΩ	013 l1xxx	013 12xxx
ARV322	2350	±1%	10 to 1 $M\Omega$	013 2xxxx	013 3xxxx
Jumper	2350	-	0 Ω	013 91001	

- (1) The resistors have a 12-digit ordering code starting with 2350.
- (2) The subsequent 4 or 5 digits indicate the resistor tolerance and packaging.
- (3) The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in the table of "Last digit of I2NC".
- (4) "L" is optional symbol (Note).

# **ORDERING EXAMPLE**

The ordering code of a ARV321 resistor, value 1,000  $\Omega$  with  $\pm 5\%$  tolerance, supplied in tape of 10,000 units per reel is: 235001311102(L) or YC122-JR-071KL.

Last digit of I2NC Resistance decade <sup>(3)</sup>	Last digit
0.01 to 0.0976 Ω	0
0.1 to 0.976 Ω	7
I to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 $\Omega$	1
I to 9.76 KΩ	2
10 to 97.6 KΩ	3
100 to 976 KΩ	4
I to 9.76 M $\Omega$	5
10 to 97.6 MΩ	6

 		0200 0. 200
0.3 Ω	=	3007 or 307
ΙΩ	=	1008 or 108
33 KΩ	=	3303 or 333
Ι0 ΜΩ	=	1006 or 106

= 0200 or 200

0.02 O

Example:

## NOTE

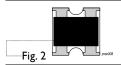
- 1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- 2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)



# <u>MARKING</u> YCI02 Fig. I

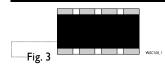
No marking

# YC122



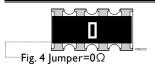
No marking

# YCI04

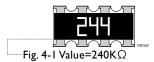


No marking

# YC124 / 162 / 164 / 324



I-Digit marking



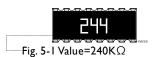
E-24 series: 3 digits, 5%

First two digits for significant figure and 3rd digit for number of zeros

# YC248



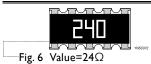
I-Digit marking

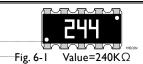


E-24 series: 3 digits, 5%

First two digits for significant figure and 3rd digit for number of zeros

#### YC158T/358L/358T

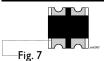




E-24 series: 3 digits

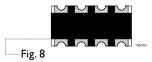
First two digits for significant figure and 3rd digit for number of zeros

# TC122



No marking

# **TC124**



No marking

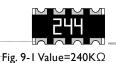
Product specification

#### TC164



I-Digit marking

Fig. 9 Jumper= $\mathbf{0}\Omega$ 



E-24 series: 3 digits, 5%

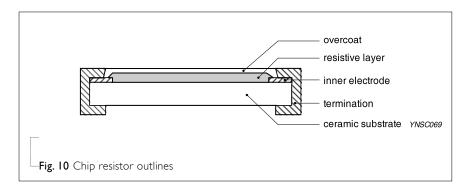
First two digits for significant figure and 3rd digit for number of zeros

For further marking information, please refer to data sheet "Chip resistors marking".

# CONSTRUCTION

The resistor is constructed on top of a high-grade ceramic body. Internal metal electrodes are added on each end to make the contacts to the thick film resistive element. The composition of the resistive element is a noble metal imbedded into a glass and covered by a second glass to prevent environment influences. The resistor is laser trimmed to the rated resistance value. The resistor is covered with a protective epoxy coat, finally the two external terminations (matte tin on Nibarrier) are added as shown in Fig.9.

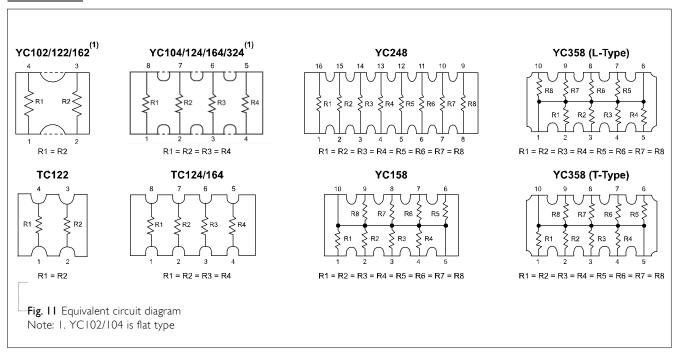
#### **OUTLINES**

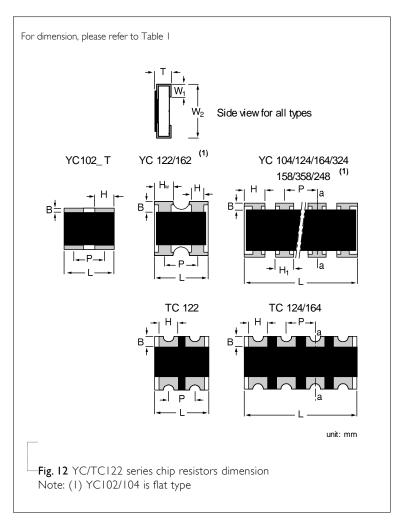


Chip Resistor Surface Mount YC/TC SERIES

102 to 358

# **SCHEMATIC**





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# Chip Resistor Surface Mount YC/TC SERIES 102 to 358

# **DIMENSIONS**

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TYPE	$H/H_{I}/H_{W}$	В	Р	L	Т	WI	W2
YC102	H: 0.25 ± 0.10	0.15 ±0.10	0.55 ±0.10	0.80 ±0.10	0.35 ±0.10	0.15 ±0.10	0.60 ±0.10
YCI04	H: 0.20 ± 0.10	0.15 <b>±</b> 0.05	0.40 ±0.10	1.40 ±0.10	0.35 <b>±</b> 0.10	0.15 <b>±</b> 0.10	0.60 ±0.10
YC122	H: 0.21+0.10 / -0.05 H <sub>w</sub> : 0.35 ±0.10	0.20 ±0.10	0.67 <b>±</b> 0.05	1.00 ±0.10	0.30 ±0.10	0.25 <b>±</b> 0.10	1.00 ±0.10
YC124	H: $0.45 \pm 0.05$ H <sub>1</sub> : $0.30 \pm 0.05$	0.20 <b>±</b> 0.15	0.50 <b>±</b> 0.05	2.00 <b>±</b> 0.10	0.45 <b>±</b> 0.10	0.30 <b>±</b> 0.15	1.00 ±0.10
YC162	H: 0.30 ±0.10 H <sub>w</sub> : 0.65 ±0.15	0.30 <b>±</b> 0.10	0.80 <b>±</b> 0.05	1.60 <b>±</b> 0.10	0.40 <b>±</b> 0.10	0.30 <b>±</b> 0.10	1.60 ±0.10
YC164	H: 0.65 ±0.05 H <sub>I</sub> : 0.50 ±0.15	0.30 <b>±</b> 0.15	0.80 <b>±</b> 0.05	3.20 <b>±</b> 0.15	0.60 <b>±</b> 0.10	0.30 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YC248	H: 0.45 ±0.05 H <sub>1</sub> : 0.30 ±0.05	0.30 <b>±</b> 0.15	0.50 <b>±</b> 0.05	4.00 <b>±</b> 0.20	0.45 <b>±</b> 0.10	0.40 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YC324	H: 1.10 ±0.15 H <sub>1</sub> : 0.90 ±0.15	0.50 <b>±</b> 0.20	1.27 <b>±</b> 0.05	5.08 <b>±</b> 0.20	0.60 ±0.10	0.50 <b>±</b> 0.15	3.20 <b>±</b> 0.20
TC122	H: 0.30 ±0.05	0.25 <b>±</b> 0.15	0.50 <b>±</b> 0.05	1.00 ±0.10	0.30 ±0.10	0.25 <b>±</b> 0.15	1.00 ±0.10
TCI24	H: 0.30 ±0.10	0.20 ±0.10	0.50 <b>±</b> 0.05	2.00 ±0.10	0.40 ±0.10	0.25 <b>±</b> 0.10	1.00 ±0.10
TC164	H: 0.50 ±0.15	0.30 ±0.15	0.80 ±0.05	3.20 <b>±</b> 0.15	0.60 ±0.10	0.30 <b>±</b> 0.15	1.60 ±0.15
YCI58T	H: 0.45 <b>±</b> 0.05 H <sub>I</sub> : 0.32± 0.05	0.30 <b>±</b> 0.15	0.64 <b>±</b> 0.05	3.20 <b>±</b> 0.20	0.60 <b>±</b> 0.10	0.35 <b>±</b> 0.15	1.60 <b>±</b> 0.15
YC358L YC358T	H: 1.10±0.15 H <sub>I</sub> : 0.90±0.15	0.50 <b>±</b> 0.15	1.27 <b>±</b> 0.05	6.40 <b>±</b> 0.20	0.60 <b>±</b> 0.10	0.50 <b>±</b> 0.15	3.20 <b>±</b> 0.20



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# **ELECTRICAL CHARACTERISTICS**

Table 2	2								
TYPE	POWER P <sub>70</sub>	OPERATING TEMP. RANGE	MWV	RCOV	DWV	RESISTANCE RANGE & TOLERANCE	T. C. R.	Jumper crit (unit	
YC102	1/32W	-55°C to +125°C	15V	30V	30V	E24 $\pm 5\%$ $10\Omega \le R \le IM\Omega$ E24/E96 $\pm 1\%$ $10\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$	±200 ppm/°C-	Rated current Max. current	
YC104	1/32W	-55°C to +125°C	12.5V	25V	25V	E24 $\pm$ 5% $10\Omega \le R \le IM\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$	±200 ppm/ C-	Rated current Max. current	
YCI22	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm 5\%$   $\Omega \le R \le  M\Omega $ E24/E96 $\pm 1\%$   $\Omega \le R \le  M\Omega $ Jumper $< 0.05\Omega$		Rated current Max. current	0.5 1.0
YCI24	1/16W	-55°C to +155°C	25V	50V	100V	E24 $\pm 5\%$   $\Omega \le R \le  M\Omega $ E24/E96 $\pm 1\%$   $\Omega \le R \le  M\Omega $ Jumper $< 0.05\Omega$	$1\Omega \le R \le 10\Omega^{-1}$ $\pm 250 \text{ ppm/°C}$ $10\Omega \le R \le 1M\Omega$ $\pm 200 \text{ ppm/°C}$	Rated current Max. current	
YC162	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm 5\%$   $\Omega \le R \le IM\Omega$ E/24/E96 $\pm 1\%$   $\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$	±200 ррп// С-	Rated current Max. current	
YC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5%   $\Omega \le R \le  M\Omega $ E24/E96 $\pm$ 1%   $\Omega \le R \le  M\Omega $ Jumper $< 0.05\Omega$		Rated current Max. current	
YC248	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le IM\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$		Rated current Max. current	
YC324	1/8W	-55°C to +155°C	200V	500V	500V	E24 $\pm$ 5% $10\Omega \le R \le 1M\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le 1M\Omega$	-		
TC122	1/16W	-55°C to +125°C	50V	100V	100V	E24 $\pm 5\%$ $10\Omega \le R \le IM\Omega$ E24/E96 $\pm 1\%$ $10\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$	±200 ppm/°C -	Rated current Max. current	1.0
TCI24	1/16W	-55°C to +125°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le IM\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$	±200 ppm C-	Rated current Max. current	
TC164	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm$ 5% $10\Omega \le R \le IM\Omega$ E24/E96 $\pm$ 1% $10\Omega \le R \le IM\Omega$ Jumper $< 0.05\Omega$	-	Rated current Max. current	
YCI58T	1/16W	-55°C to +155°C	25V	50V	50V	E24 ±5% 10Ω≤R≤ 100KΩ	-		
YC358L YC358T	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 10 <b>Ω</b> ≤ R ≤ 330K <b>Ω</b>	-		

# FOOTPRINT AND SOLDERING PROFILES

For recommended footprint and soldering profiles, please refer to data sheet "Chip resistors mounting".

# PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	PACKING STYLE	YC102/ 104	YC/TC 122	YC/TC 124	YC162	YC/TC 164	YC248	YC324	YC158T	YC358L YC358T
Paper taping reel (R)	7" (178mm)	10,000	10,000	10,000	5,000	5,000	5,000		5,000	
	13" (254mm)	50,000	50,000	40,000		20,000			20,000	
Embossed taping reel ( K)	7" (178mm)						4,000	4,000		4,000

1. For tape and reel specification/dimensions, please refer to data sheet "Chip resistors packing".

# **FUNCTIONAL DESCRIPTION**

#### **OPERATING TEMPERATURE RANGE**

YC102/104/122/162, TC122/124 Range:

-55°C to +125°C (Fig.13)

YC124/164/248/324/158T/358L/358T, TC164 Range:

-55°C to +155°C(Fig.14)

#### **POWER RATING**

Each type rated power at 70°C YC102/104 = 1/32 W YC122/124/162/164/248/158T/358L/358T = 1/16 W YC324 = 1/8 W

TC122/124/164 = 1/16 W



The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V = \sqrt{(P \times R)}$$

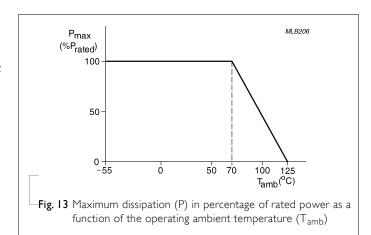
or max. working voltage whichever is less

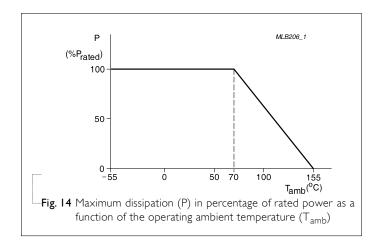
Where

V=Continuous rated DC or AC (rms) working voltage (V)

P=Rated power (W)

R=Resistance value ( $\Omega$ )





# TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A IEC 60115-1 4.25.1 JIS C 5202-7.10	LE bassing on OE bassing off still also in a suite of	$\pm (2\% + 0.05~\Omega)$ <100 m $\Omega$ for Jumper
High Temperature Exposure/ Endurance at Upper Category Temperature	MIL-STD-202G-method 108A IEC 60115-1 4.25.3 JIS C 5202-7.11	I,000 hours at maximum operating temperature depending on specification, unpowered  No direct impingement of forced air to the parts  Tolerances: I25±3 °C	$\pm$ (1%+0.05 Ω) <50 mΩ for Jumper
Moisture Resistance	MIL-STD-202G-method 106F IEC 60115-1 4.24.2	Each temperature / humidity cycle is defined at 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered  Parts mounted on test-boards, without condensation on parts  Measurement at 24±2 hours after test conclusion	,
Thermal Shock	MIL-STD-202G-method I07G	-55/+125 °C  Note: Number of cycles required is 300.  Devices mounted  Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air — Air	$\pm$ (1%+0.05 Ω) <50 mΩ for Jumper
Short Time Overload	MIL-R-55342D-para 4.7.5 IEC60115-1 4.13	2.5 times RCWV or maximum overload voltage whichever is less for 5 sec at room temperature	±(2%+0.05 Ω) <50 mΩ for Jumper No visible damage
Board Flex/ Bending	IEC60115-1 4.33	Device mounted on PCB test board as described, only I board bending required 3 mm bending Bending time: 60±5 seconds Ohmic value checked during bending	$\pm$ (1%+0.05 $\Omega$ ) <50 m $\Omega$ for Jumper No visible damage



YC/TC SERIES

102 to 358

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	IPC/JEDECJ-STD-002B test B IEC 60068-2-58	Electrical Test not required  Magnification 50X  SMD conditions:  Ist step: method B, aging 4 hours at 155 °C  dry heat	Well tinned (≥95% covered) No visible damage
		2 <sup>nd</sup> step: leadfree solder bath at 245±3 °C Dipping time: 3±0.5 seconds	
- Leaching	IPC/JEDECJ-STD-002B test D IEC 60068-2-58	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	MIL-STD-202G-method 210F IEC 60068-2-58	Condition B, no pre-heat of samples Leadfree solder, 260 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	$\pm (1\% + 0.05 \ \Omega)$ <50 m $\Omega$ for Jumper No visible damage

# REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 7	Aug. 22, 2017	-	- Correct the typo for YC158T/358L/358T, Marking, "240" is 240hm
Version 6	Jun. 1, 2017	-	- Update ordering information for networks YC158T/YC358L/YC358T
Version 5	Feb. 14, 2017	-	- Update YC158 and 358 part number to YC158T , YC358L and YC358T
Version 4	Dec. 22, 2016	-	- Delete YC102 default code L type
Version 3	Apr. 29, 2016	-	- Update YC series and TC164 dimension
Version 2	Dec. 11, 2015	-	- Update Operating Temperature
Version I	Feb. 04, 2015	-	- Update YC102 to flat type
Version 0	Nov. 14, 2014	-	- First issue of this specification

<sup>&</sup>quot;Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products itself are unchanged. Any product change will be announced by PCN."



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YC164-JR-074K7L YC164-JR-078K2L YC164-JR-072K2L YC164-JR-0756RL YC248-JR-0710KL TC164-JR-0733RL YC124-JR-0733RL YC164-JR-070RL YC164-JR-07100RL YC164-JR-0710KL YC164-JR-0710RL YC164-JR-07150RL YC164-JR-0747RL YC164-JR-0751RL YC164-JR-0775RL YC164-JR-072K7L YC248-JR-074K7L TC164-JR-07100RL TC164-JR-0710KL YC164-JR-072KL YC164-JR-07220KL YC122-JR-0715RL YC124-JR-0724RL YC164-JR-075K6L YC164-JR-071ML YC164-JR-07220RL YC164-FR-07100RL TC164-JR-0747RL YC164-JR-07180RL TC164-JR-0722KL YC122-JR-0710RL YC124-JR-0727RL YC164-JR-07160RL YC124-JR-07330RL YC122-JR-0722RL YC164-JR-0747KL TC164-JR-0710RL TC164-JR-07220RL TC164-JR-0722RL YC124-JR-0710KL YC164-JR-0722KL TC164-JR-07100KL TC164-JR-070RL YC124-JR-07150RL YC124-FR-0733RL YC122-JR-0736RL YC164-JR-07120RL YC164-JR-0715KL YC164-JR-0722RL YC124-JR-0768RL YC164-JR-07240RL YC164-JR-0751KL YC124-JR-071KL YC124-JR-0747KL YC124-JR-074K7L YC124-JR-0710RL TC164-JR-071KL YC164-JR-0727RL YC164-JR-07200RL YC164-JR-07300RL YC164-JR-07470RL YC124-JR-073K3L TC164-JR-0747KL YC164-JR-075K1L YC124-FR-0749R9L YC164-JR-07390RL YC124-JR-0751RL YC124-JR-07100KL YC124-JR-07100RL YC124-JR-0747RL YC164-JR-0720KL YC124-JR-0756RL YC164-JR-07510RL TC164-JR-07270RL YC124-JR-0715RL YC124-JR-070RL TC164-JR-073K3L YC124-JR-0736RL YC164-JR-0739RL TC164-JR-07330RL YC164-JR-071K8L YC164-JR-07130RL TC164-JR-07470RL TC164-JR-072K7L YC164-JR-07680RL YC164-JR-071K2L YC124-JR-0739RL YC164-JR-07330RL YC164-JR-07560RL TC164-JR-07120RL YC124-JR-0775RL YC164-JR-0724RL YC164-JR-071K5L TC164-JR-072K2L YC164-JR-07100KL YC124-JR-0782RL YC124-JR-0730RL TC164-JR-074K7L TC164-JR-0751RL YC158TJR-0762RL