NEC

COMPOUND FIELD EFFECT POWER TRANSISTOR
μPA1603

MONOLITHIC POWER MOS FET ARRAY

DESCRIPTION

The μPA1603 is Monolithic N-channel Power MOS FET Array that built in 4 circuits, Clump Diode and resistances designed for LED, Relay, Thermal Head, and so on.

FEATURES

- Direct driving is possible by standard Logic IC or Microcomputer. (4 V driving is possible)
- Output Voltage: $V_{O(peak)}$ = 50 V MAX.
  Output Current: $I_{O(peak)}$ = 1.5 A MAX.
- R_{on} = 1 Ω TYP. at: I_O = 600 mA, V_I = 4 V
- Wide Operation Temperature: –40 to +85 °C
- Output Voltage Clump Diode built in.

ORDERING INFORMATION

Part Number	Package	Quality Grade
μPA1603CX	16-Pin DIP	Standard

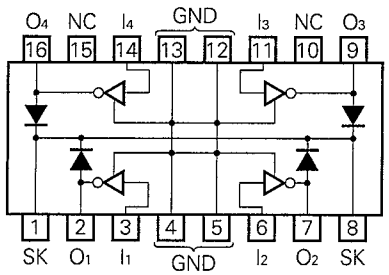
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Output Voltage	$V_{O(DC)}$	30	V
Output Peak Voltage*	$V_{O(peak)}$	50	V
Input Voltage	V_I	–0.5 to +20	V
Output Current (DC)	$I_{O(DC)}$	870	mA/unit
Output Current (pulse)**	$I_{O(pulse)}$	1500	mA/unit
Input Current	I_I	±10	mA/unit
Diode Reverse Voltage	V_R	50	V
Diode Forward Current	I_F	1500	mA/unit
Total Power Dissipation	P_D	1.0	W/PKG
Operating Temperature	T_{opt}	–40 to +85	°C
Storage Temperature	T_{stg}	–55 to +150	°C

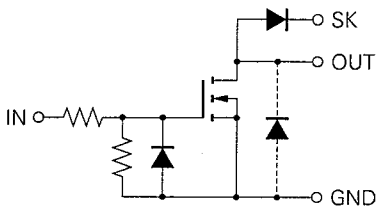
* PW ≦ 10 ms, Duty Cycle ≦ 50 %
** PW ≦ 10 ms, Duty Cycle ≦ 30 %

CONNECTION DIAGRAM



I : Input
O : Output

Equivalent Circuits (1/8 Circuit)



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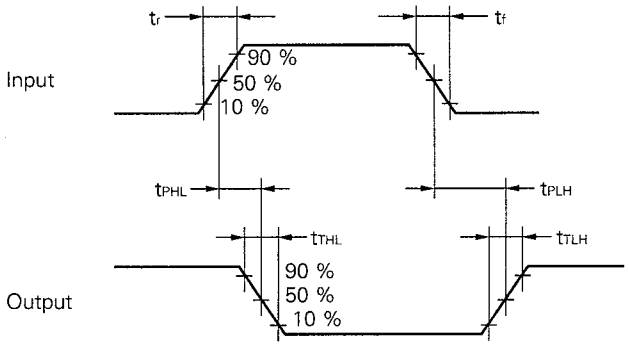
RECOMMENDED OPERATING CONDITIONS (T_a = −40 to +85 °C)

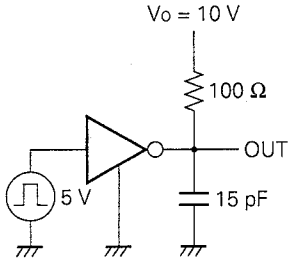
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Voltage	$V_{O(DC)}$			28	V	
Output Current	$I_{O(DC)}$			540	mA/unit	DC, 1 circuit
	$I_{O(pulse)}$			600	mA/unit	PW ≦ 10 ms, Duty Cycle ≦ 20 %, 4 circuits
Input Voltage	V_I	0		15	V	
High-Level Input Voltage	V_{IH}	2			V	
Low-Level Input Voltage	V_{IL}			0.8	V	
Diode Reverse Voltage	V_R			40	V	
Diode Forward Current	I_F			600	mA	

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Output Leakage Current	$I_{O(OFF)}$			10	μA	V_I = 0, V_O = 50 V
Output On-state Resistance	R_{on}		1	1.3	Ω	V_I = 4 V, I_O = 600 mA
Output On-state Voltage	$V_{O(ON)1}$			0.1	V	V_I = 5 V, I_O = 10 mA
	$V_{O(ON)2}$			1.0	V	V_I = 5 V, I_O = 600 mA
Input Voltage	$V_{I(OFF)}$			0.8	V	V_O = 50 V, I_O = 100 μA
	$V_{I(ON)1}$	2			V	V_O = 0.8 V, I_O = 1 mA
	$V_{I(ON)2}$	4			V	V_O = 0.8 V, I_O = 600 mA
Input Current	I_{IH}			2	mA	V_I = 20 V, V_O = 0 V
	I_{IL}			−1	μA	V_I = 0 V, V_O = 50 V
Input Capacitance	C_{iss}		80		pF	V_I = 0 V V_O = 10 V f = 1 MHz
Output Capacitance	C_{oss}		100		pF	
Reverse Transfer Capacitance	C_{rss}		40		pF	
Delay Time	t_{PHL}		20		ns	V_O = 10 V, R_L = 100 Ω C_L = 15 pF t_r, t_f ≦ 5 ns See Fig. 1
	t_{PLH}		70		ns	
Rise Time	t_{TLH}		50		ns	
Fall Time	t_{THL}		30		ns	
Diode Leakage Current	I_R			50	μA	V_R = 50 V, T_a = 25 °C
				100	μA	V_R = 50 V, T_a = 85 °C
Diode Forward Voltage	V_F			2	V	I_F = 1.25 A

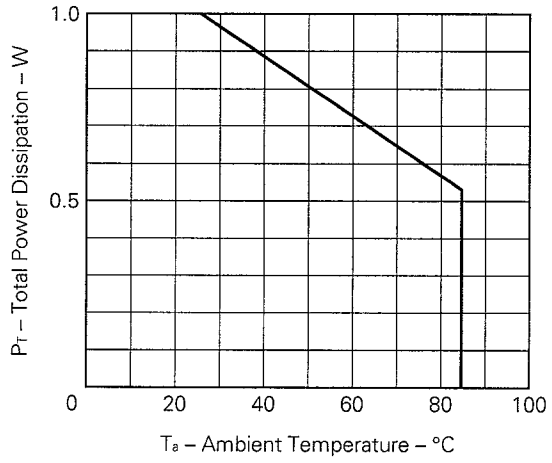
Fig. 1 Switching Wave Forms and Test Circuits



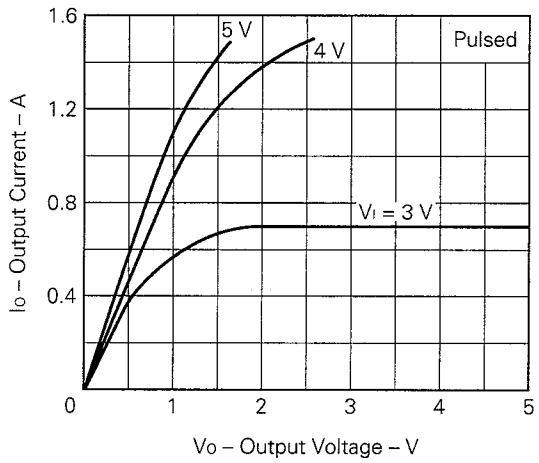


TYPICAL CHARACTERISTICS (T_a = 25 °C)

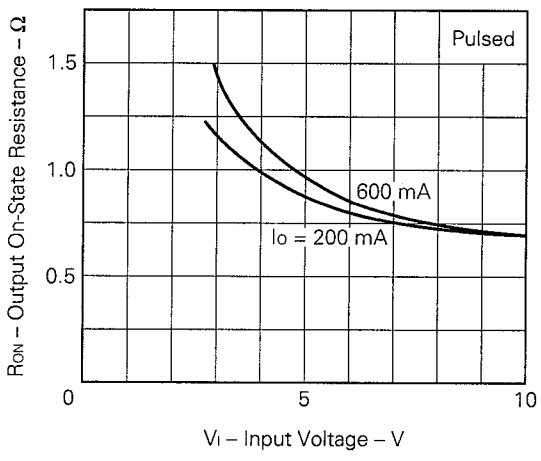
P_T – T_a Characteristic



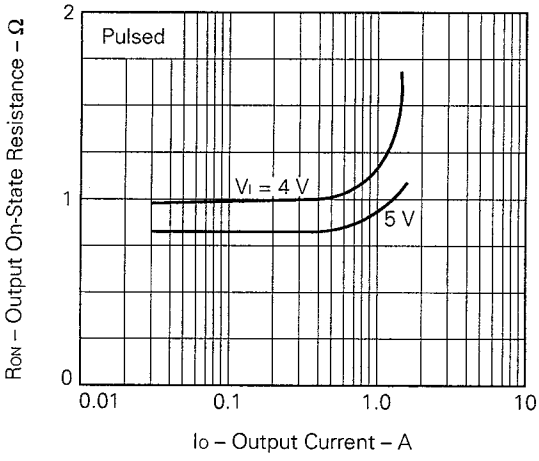
I_O – V_O Characteristic



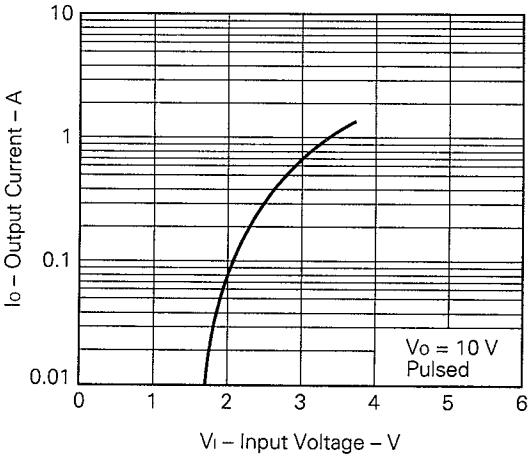
R_{ON} – V_{DD} Characteristic



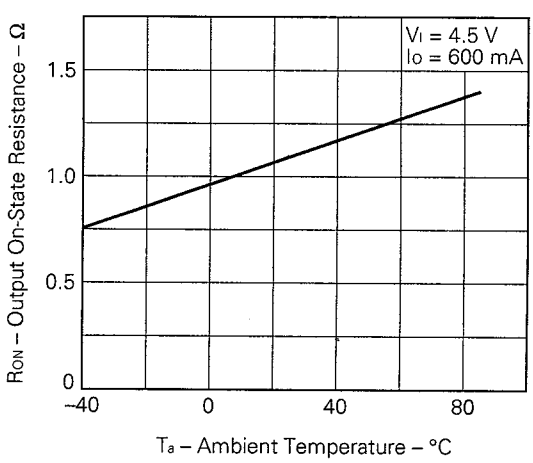
R_{ON} – I_O Characteristic



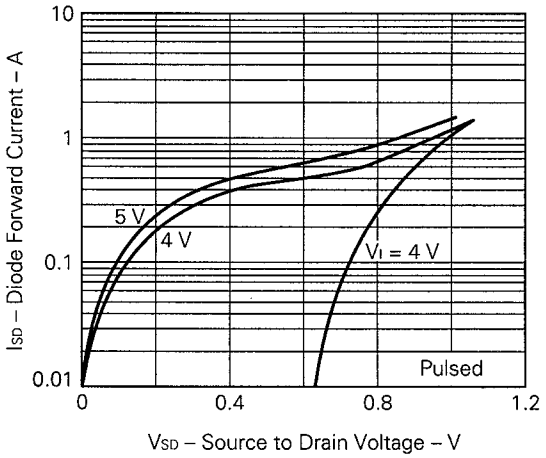
I_O – V_I Characteristic



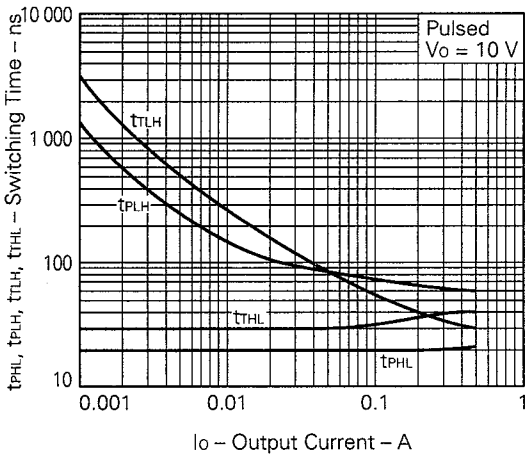
R_{ON} – T_a Characteristic



I_{SD} – V_{SD} Characteristic



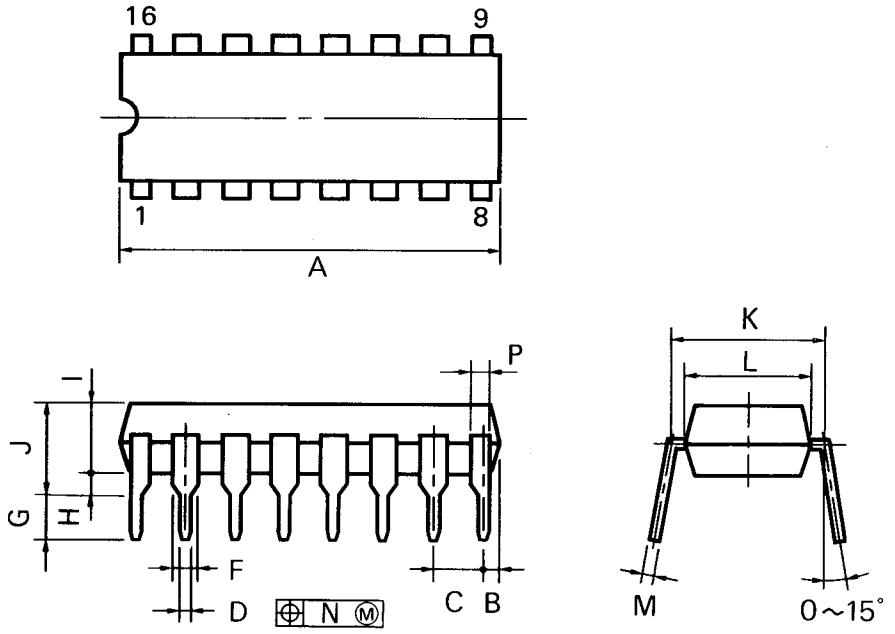
t_{PHL}, t_{PLH}, t_{THL}, t_{TLH} – I_O Characteristic



PACKAGE DIMENSIONS

• μPA1603CX

16PIN PLASTIC DIP (300 mil)



P16C-100-300A,C

NOTES

1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.800 MAX.
B	1.27 MAX.	0.050 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	$0.50^{\pm 0.10}$	$0.020^{+0.004}_{-0.005}$
F	1.2 MIN.	0.047 MIN.
G	$3.5^{\pm 0.3}$	$0.138^{\pm 0.012}$
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	$0.25^{+0.10}_{-0.05}$	$0.010^{+0.004}_{-0.003}$
N	0.25	0.01
P	1.0 MIN.	0.039 MIN.

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

TYPES OF THROUGH HOLE MOUNT DEVICE

μPA1603CX

Soldering process	Soldering conditions	Symbol
Wave soldering	Solder temperature: 260 °C or below, Flow time: 10 seconds or below	

Reference

Document name	Document No.
Quality control of NEC semiconductors devices.	TEI-1202
Quality control guide of semiconductors devices.	MEI-1202
Assembly manual of semiconductors devices.	IEI-1207
Semiconductor device package manual	IEI-1213
SMD surface mount technology manual	IEI-1207

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