NTE2716
Integrated Circuit
NMOS, 16K UV Erasable PROM

Description:

The NTE2716 is a 16,384–bit (2048 x 8–bit) Erasable and Electrically Reprogrammable PROM in a 24–Lead DIP type package designed for system debug usage and similar applications requiring non-volatile memory that could be reprogrammed periodically. The transparent lid on the package allows the memory content to be erased with ultraviolet light.

The NTE2716 operates from a single power supply and has a static power down mode.

Features:

- Single 5V Power Supply
- Automatic Power–Down Mode (Standby)
- Organized as 2048 Bytes of 8Bits
- TTL Compatible During Read and Program
- Access Time: 350ns
- Output Enable Active Level is User Selectable

Absolute Maximum Ratings: (Note 1)

All Input or Output Voltages (with respect to V_{SS}) . . . . . +6 to –0.3V
V_{PP} Supply Voltage (with respect to V_{SS}) . . . . . +28 to –0.3V
Temperature Under Bias (V_{PP} = 5V) . . . . . –10° to +80°C
Operating Temperature Range, T_{opr} . . . . . 0° to +70°C
Storage Temperature Range. T_{stg} . . . . . –65° to +125°C

Note 1. Permanent device may occur if “Absolute Maximum Ratings” are exceeded. Functional operation should be restricted to “Recommended Operating Conditions”. Exposure to higher than recommended voltages for extended periods of time could affect device reliability.

Note 2. This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high–impedance circuit.

Mode Selection:

Mode	Pin Number					
	9–11, 13–17 DQ	12 V_{SS}	18 $\overline{E}$/Progr	20 $\overline{G}$ (Note3)	21 V_{PP}	24 V_{CC}
Read	Data Out	V_{SS}	V_{IL}	V_{IL}	V_{CC} (Note 3)	V_{CC}
Output Disable	High Z	V_{SS}	Don't Care	V_{IH}	V_{CC} (Note 3)	V_{CC}
Standby	High Z	V_{SS}	V_{IH}	Don't Care	V_{CC}	V_{CC}
Program	Data In	V_{SS}	Pulsed V_{IL} to V_{IH}	V_{IH}	V_{PPH}	V_{CC}
Program Verify	Data Out	V_{SS}	V_{IL}	V_{IL}	V_{PPH}	V_{CC}
Program Inhibit	High Z	V_{SS}	V_{IL}	V_{IH}	V_{PPH}	V_{CC}

Note 3. In Read Mode if $V_{PP} \geq V_{IH}$, then $\overline{G}$ (active low)
$V_{PP} \leq V_{IL}$, then G (active high)

Capacitance: (f = 1MHz, T_A = +25°C, periodically sampled rather than 100% tested)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Capacitance	C_{in}	V_{in} = 0V	–	4.0	6.0	pF
Output capacitance	C_{out}	V_{out} = 0V	–	8.0	12.0	pF

Note 4. Capacitance measured with a Boonton Meter or effective capacitance calculated from the equation: $C = \frac{I\Delta_t}{\Delta V}$

DC Operating Conditions and Characteristics: (Full Operating Voltage and Temperature Range unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Recommended DC Read Operating Conditions						
Supply Voltage	V_{CC}, V_{PP}	Note 5	4.75	5.0	5.25	V
Input High Voltage	V_{IH}		2.0	–	V_{CC}+1.0	V
Input Low Voltage	V_{IL}		–0.1	–	+0.8	V
Recommended DC Operating Conditions						
Address, $\overline{G}$ and $\overline{E}$/Progr Input Sink Current	I_{in}	V_{in} = 5.25V	–	–	10	µA
Output Leakage Current	I_{LO}	V_{out} = 5.25V, $\overline{G}$ = 5V	–	–	10	µA
V_{CC} Supply Current (Standby)	I_{CC1}	$\overline{E}$/Progr = V_{IH}, $\overline{G}$ = V_{IL}	–	–	25	mA
V_{CC} Supply Current (Active)	I_{CC2}	Outputs Open, $\overline{G}$ = $\overline{E}$/Progr = V_{IL}	–	–	100	mA
V_{CC} Supply Current	I_{PP1}	V_{PP} = 5.25V, Note 5	–	–	5	mA
Output Low Voltage	V_{OL}	I_{OL} = 2.1mA	–	–	0.45	V
Output High Voltage	V_{OH}	I_{OH} = –400µA	2.4	–	–	V

Note 5. V_{CC} must be applied simultaneously or prior to V_{PP}. V_{CC} must also be switched off simultaneously with or after V_{PP}. With V_{PP} connected directly to V_{CC} during the read operation, the supply current would then be the sum of I_{PP1} and I_{CC}.

AC Operating Conditions and Characteristics: (Full Operating Voltage and Temperature Range, Note 6, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Address Valid to Output Valid	t_{AVQV}	$\overline{E}$/Progr = $\overline{G}$ = V_{IL}	–	–	350	ns
$\overline{E}$/Progr to Output Valid	t_{ELQV}	Note 7	–	–	350	ns
Output Enable to Output Valid	t_{GLQV}	$\overline{E}$/Progr = V_{IL}	–	–	150	ns
$\overline{E}$/Progr to High Z Output	t_{EHQZ}		0	–	100	ns
Output Disable to High Z Output	t_{GHQZ}	$\overline{E}$/Progr = V_{IL}	0	–	100	ns
Data Hold from Address	t_{AXDX}	$\overline{E}$/Progr = G = V_{IL}	0	–	–	ns

Note 6. Input Pulse Levels . . . . . 0.8V and 2.2V
Input Rise and Fall Times 20ns
Input and Output Timing Levels . . . . 2.0 and 0.8V

Note 7. t_{ELQV} is referenced to $\overline{E}$/Progr or stable address, whichever occurs last.

DC Programming Conditions and Characteristics: (T_A = +25°C ±5°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Recommended Programming Operating Conditions						
Supply Voltage	V_{CC}, V_{PPL}		4.75	5.0	5.25	V
	V_{PPH}		24.0	25.0	26.0	V
Input High Voltage for Data	V_{IH}		2.2	–	V_{CC}+1.0	V
Input Low Voltage for Data	V_{IL}		–0.1	–	+0.8	V
Programming Operating DC Characteristics						
Address, $\overline{G}$ and $\overline{E}$/Progr Input Sink Current	I_{LI}	V_{in} = 5.25V/0.45V	–	–	10	µA
V_{PP} Programming Pulse Supply Current	I_{PP2}	V_{PP} = 25V ±1V, $\overline{E}$/Progr = V_{IH}	–	–	30	mA
V_{CC} Supply Current	I_{CC}	Outputs Open	–	–	160	mA

AC Programming Operating Conditions and Characteristics:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Address Setup Time	t_{AVEH}		2.0	–	–	µs
Output Enable High to Program Pulse	t_{GHEH}		2.0	–	–	µs
Data Setup Time	t_{DVEH}		2.0	–	–	µs
Address Hold Time	t_{ELAX}		2.0	–	–	µs
Output Enable Hold Time	t_{ELGL}		2.0	–	–	µs
Data Hold Time	t_{ELQZ}		2.0	–	–	µs
V_{PP} Setup Time	t_{PHEH}		0	–	–	ns
V_{PP} to Enable Low Time	t_{ELPL}		0	–	–	ns
Output Disable to High Z Output	t_{GHQZ}		0	–	150	ns
Output Enable to Valid Data	t_{GLQV}	$\overline{E}$/Progr = V_{IL}	–	–	150	ns
Program Pulse Width	t_{EHEL}	Note 8	1	–	55	ms
Program Pulse Rise Time	t_{PR}		5	–	–	ns
Program Pulse Fall Time	t_{PF}		5	–	–	ns

Note 8. If shorter than 45ms (min) pulses are used, the same number of pulses should be applied after the specific data has been verified to ensure that good programming levels have been written.

Pin Connection Diagram