

# P-Channel Enhancement-Mode MOS Transistors, VP0610 Series



## VP0610E / VP0610L / VP0610T

### FEATURES

- P-Channel Equivalent to 2N7000 Series
- Available in Surface Mount SOT-23
- Low  $r_{DS(on)}$  .....  $<10\Omega$
- By ..... 60V


### APPLICATIONS

- Switching
- Amplification

### ORDERING INFORMATION


Part	Package	Temperature Range
VP0610E	Hermetic TO-206AC	-55°C to +150°C
VP0610L	Plastic TO-92	-55°C to +150°C
VP0610T	Surface Mount SOT-23	-55°C to +150°C
XVP0610	Sorted chips in carriers	-55°C to +150°C

### PIN CONNECTIONS




TO-52  
(TO-206AC)

BOTTOM VIEW




1 SOURCE  
2 GATE  
3 DRAIN & CASE

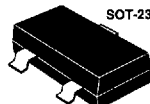


TO-92  
(TO-226AA)

BOTTOM VIEW

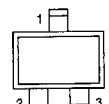


1 SOURCE  
2 GATE  
3 DRAIN



SOT-23

TOP VIEW



1 DRAIN  
2 SOURCE  
3 GATE

PRODUCT MARKING	
VP0610T	V06

CD7

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

SYMBOL	PARAMETERS/TEST CONDITIONS	LIMITS			UNITS
		VP0610E <sup>2</sup>	VP0610L	VP0610T	
$V_{DS}$	Drain-Source Voltage	-60	-60	-60	V
$V_{GS}$	Gate-Source Voltage <sup>2</sup>	$\pm 20$	$\pm 30$	$\pm 30$	
$I_D$	Continuous Drain Current	$T_A = 25^\circ\text{C}$	-0.25	-0.18	A
		$T_A = 100^\circ\text{C}$	-0.15	-0.11	
$I_{DM}$	Pulsed Drain Current <sup>1</sup>		-1	-0.8	-0.4
$P_D$	Power Dissipation	$T_A = 25^\circ\text{C}$	1.5	0.80	0.36
		$T_A = 100^\circ\text{C}$	0.6	0.32	0.14
$T_J, T_{stg}$	Operating Junction & Storage Temperature Range	-55 to 150			$^\circ\text{C}$
$T_L$	Lead Temperature (1/16" from case for 10 sec.)	300			

### THERMAL RESISTANCE RATINGS

SYMBOL	THERMAL RESISTANCE	LIMITS			UNITS
		VP0610E	VP0610L	VP0610T	
$R_{thJA}$	Junction-to-Ambient	400	156	350	$^\circ\text{C/W}$

<sup>1</sup>Pulse width limited by maximum junction temperature.

<sup>2</sup>Reference  $T_c$  for all tests.

ELECTRICAL CHARACTERISTICS <sup>a</sup>			LIMITS						UNITS	TEST CONDITIONS
SYMBOL	PARAMETER	TYP <sup>b</sup>	VP0610E		VP0610L		VP0610T			
			MIN	MAX	MIN	MAX	MIN	MAX		
<b>STATIC</b>										
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	-70	-60		-60		-60		V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -10μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	-2	-1	-3.5	-1	-3.5	-1	-3.5		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA
I <sub>GSS</sub>	Gate-Body Leakage	±1		±10		±10		±10	nA	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V T <sub>J</sub> = 125°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	-0.02		-1		-1		-1	μA	V <sub>DS</sub> = -48V, V <sub>GS</sub> = 0V T <sub>J</sub> = 125°C
		-0.2		-200		-200		-200		
I <sub>D(ON)</sub>	On-State Drain Current <sup>c</sup>	-700	-600		-600		-220		mA	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -10V
r <sub>DS(ON)</sub>	Drain-Source On-Resistance <sup>c</sup>	8		10		10		10	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -0.5A T <sub>J</sub> = 125°C
		15		20		20		20		
g <sub>FS</sub>	Forward Transconductance <sup>c</sup>	135	80		80		70		mS	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.5A
g <sub>OS</sub>	Common Source Output Conductance <sup>c</sup>	400							μS	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.2A
<b>DYNAMIC</b>										
C <sub>iss</sub>	Input Capacitance	15		60		60		60	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1MHz
C <sub>oss</sub>	Output Capacitance	10		25		25		25		
C <sub>rss</sub>	Reverse Transfer Capacitance	3		5		5		5		
<b>SWITCHING</b>										
t <sub>d(ON)</sub>	Turn-On Time	6		10		10		10	ns	V <sub>DD</sub> = -25V, R <sub>L</sub> = 133Ω, I <sub>D</sub> = -0.18A V <sub>GEN</sub> = -10V, R <sub>G</sub> = 25Ω (Switching time is essentially independent of operating temperature)
t <sub>r</sub>		10		15		15		15		
t <sub>d(OFF)</sub>	Turn-Off Time	7		15		15		15		
t <sub>f</sub>		8		20		20		20		

**Notes:**

- T<sub>A</sub> = 25°C unless otherwise noted T<sub>C</sub> = 25°C for VP0610E.
- For design aid only, not subject to production testing.
- Pulse test; PW = 300μs, duty cycle ≤2%.