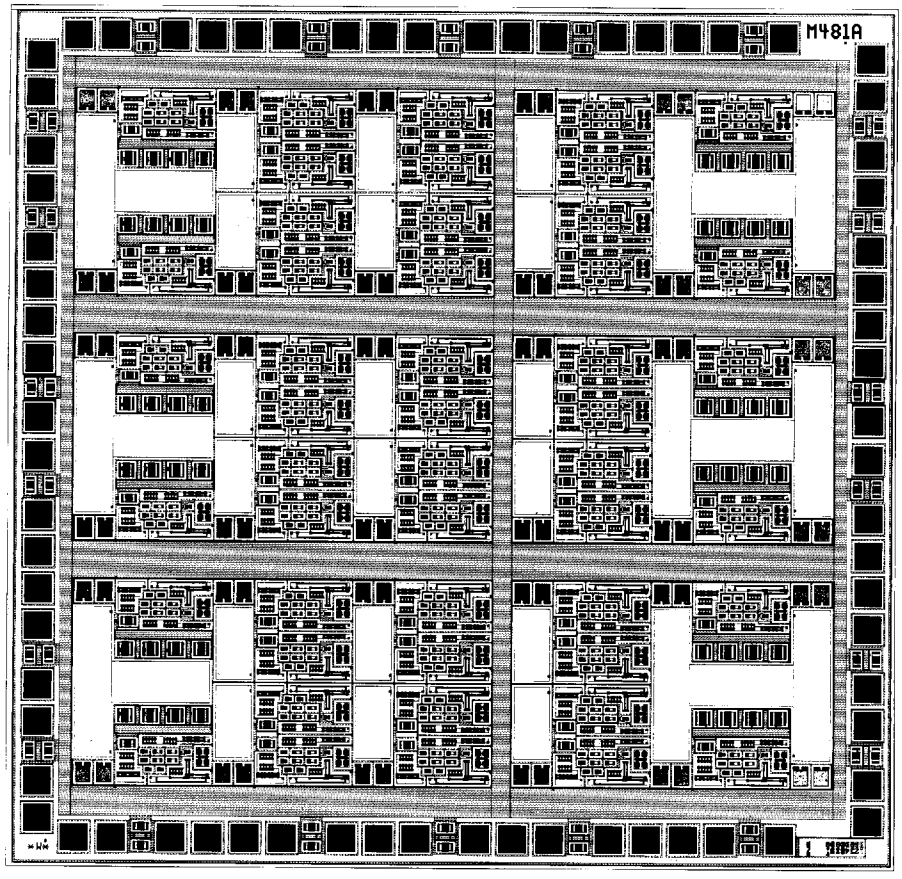
QUICKCHIP 2 FAMILY OF INTEGRATED CIRCUIT ARRAYS

The QuickChip™ 2 integrated circuit substrates comprise a family of arrays of uncommitted very high speed bipolar transistors, capacitors and resistors. The analog circuit designer can quickly interconnect these components to meet application requirements using the TEKTRONIX QuickCustom™ Design Process.

The QuickCustom approach provides:

- Quick turnaround from design to an actual device
- Custom circuitry at low cost
- High performance
- High reliability
- High probability of first time success



QuickChip 2L

Chip Description

The QuickChip 2 family of integrated circuit substrates is fabricated with a bipolar process (a) that offers low noise (f), very high speed NPN transistors, typical f_T of 6.5 GHz, with high current drive capability. These substrates allow interconnecting components to meet application requirements by adding customized single or dual-layer metal patterns. The QuickChip 2 Integrated Circuit is configured as an array of ten full mirror-symmetric tiles and two half tiles plus several devices on the perimeter of the tiles. QuickChip 2S Integrated Circuit has six full tiles, two half tiles and perimeter devices. QuickChip 2L Integrated Circuit is configured as an array of 18 full mirror-symmetric QuickChip 2 tiles and 12 half tiles surrounded by 70 bondpads.

The 98 mils × 98 mils (2.49 mm × 2.49 mm) QuickChip 2 IC will fit many packages from the 24 pin DIP on up. The QuickChip 2S IC, on a 78 mils × 98 mils (1.98 mm × 12.49 mm) die, fits packages as small as 16 pin DIP. The 161 mils × 165 mils (4.09 mm × 4.19 mm) QuickChip 2L IC is ideally suited to packaging in 68 pin quad configurations or in custom hybrids. Other forms of packaging can be used depending on requirements. The quantity and selection of devices shown in the following table were chosen to provide design flexibility and high performance.

Tektronix®
COMMITTED TO EXCELLENCE

Typical Applications

The following applications can be implemented using the very high speed QuickChip 2 IC family:

- Analog switches
- Buffer amplifiers
- Crystal controlled oscillators
- Digital modulation circuits
- High frequency analog multipliers
- High frequency clock recovery circuits
- Low impedance line drivers
- Mixed analog and digital circuits
- Operational amplifiers
- Phase locked loops
- Preamplifiers
- Quad comparators
- Special function logic
- Stimulus generators
- Voltage controlled oscillators
- Wideband amplifiers

Design Tools

Even the first time analog IC designer will find designing with this technology easy to manage. Developed by our own engineers, who have many years of demonstrated analog expertise, this QuickCustom approach smoothly leads you through all the steps required to design your own chips. A design guide is provided that contains the necessary information for using the process, enabling even the first-time user to complete a design with minimal one-on-one coaching. We provide a process performance guide that contains a library of SPICE models for the IC transistors, resistors, capacitors and bonding pads which predict the speed and performance of your design. The first pass success ratio is high. A grid-based layout system specifies exactly where the interconnects can be routed, and the graphic layout editor, QuicKic™, makes it easy for the designer to digitize the layout.

Additionally, our experienced designers are available to provide design consultation if you require.

QuickChip Comparisons

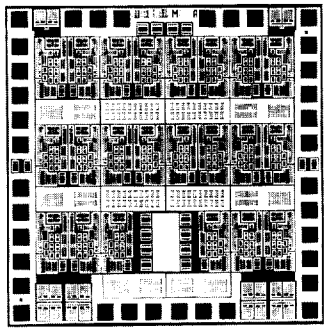
Component type*	Number per tile	QuickChip 2S	QuickChip 2	QuickChip 2L
NPN	18	150	214	524
PNP	10	82	110	240
Implanted resistors	86	602	946	2064
Capacitor sections		24	20	72
Bonding pads		24	36	70

*Custom Nichrome available on all devices in the QuickChip 2 family (c).

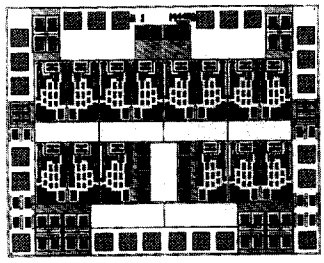
Transistor Data (h)

Device Type	I_C (mA) for peak f_T	C_{jc} (pF) at $V_{cb} = 0$	Number of Devices QuickChip 2S	QuickChip 2	QuickChip 2L
NPN ($f_T \geq 5.5$ GHz)					
small	3	0.20	112	176	384
medium	12	0.56	18	26	92
large	24	1.26	12	12*	48
PNP ($f_T \approx 20$ MHz)					
lateral	0.2	0.28	56	88	192
substrate	0.2	0.45	14	22	48

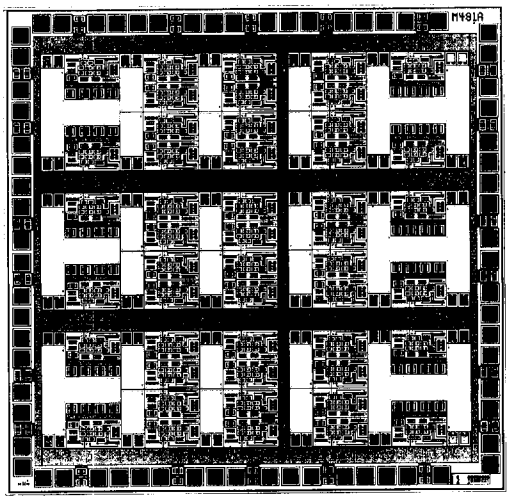
*Large NPNs on QuickChip 2 I_C for peak $f_T = 26$ mA.



QuickChip 2



QuickChip 2S



QuickChip 2L

NPN DC Parameters

Symbol	Measurement Conditions (b)	Nominal Value	Minimum Value	Maximum Value
β_F	$V_{CE}=2.5V$ $I_C=5mA$	85	50	140
V_A (Early voltage)	$V_{CE}=2.5V$ $I_C=10mA$	20V	10V	35V
V_{CEsat}	$I_B=0.5mA$ $I_C=5.0mA$	80 mV		120 mV
V_{BES}	$I_E=10ma$ $V_{CB}=0V$	820 mV	780 mV	860 mV
ΔV_{BES}	$I_E=10mA$ $V_{CB}=0V$			1.5 mV
BV_{CS} (collector-substrate breakdown)	$I_S=10\mu A$		32V	
BV_{CBO}	$I_C=10\mu A$ emitter open		15V	
LV_{CEO}	$I_C=5mA$ base open		5.5V	10.5V
BV_{EBO}	$I_E=10\mu A$ collector open		4.5V	5.5V
	$I_E=5mA$		5.4V	6.0V
BV_{ECS}	$I_E=10\mu A$		1.5V	5.5V

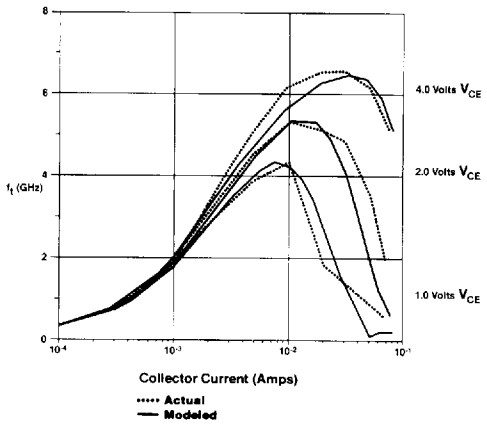
Resistor Data

Value (Ω) T = 25°C	Tol (%) T = 25°C	Type	TCR ppm/C°	Matching %	Number of Resistors QuickChip 2S	QuickChip 2	QuickChip 2L
100	±27	P+	+1400	1	350	550	1200
400	±22	P+	+1400	0.5	70	110	240
1600	±22	P+	+1400	0.5	14	22	48
3000	±28	AB	+1480	1	112	176	384
4000	±24	AB	+1480	1	56	88	192
Custom (c)	±12 (d)	NiCR	≤150	≤1 (d)	(e)	(e)	(e)

Programmable Capacitor Sections

Type	Cap. (pF)	Tol (%)	Number of Capacitors QuickChip 2S	QuickChip 2	QuickChip 2L
MOS (programmable)	1.0 max.	±11	24	20	72
Junction	2.7 at OV	±10	24	20	72

NPN Performance (b): Actual vs. Modeled



Quality Assurance

For more than 40 years, Tektronix' commitment to excellence has earned the company a reputation for making instruments of the highest quality. The products of Tektronix' Integrated Circuits Operation (ICO) have contributed to the performance and reliability of Tektronix instrumentation for more than 20 years.

Our goal is to ship 100 percent quality products on time—every time.

ICO's Quality Assurance program consists of quality systems and inspections designed to achieve these goals. These include:

- Documentation control system, including engineering change control
- Vendor qualification procedure including vendor audits, first article inspections and vendor product certification
- Lot traceability to vendor
- Independent quality and reliability audits
- Statistical analysis and statistical process control
- Operator training and certification
- Preventive maintenance programs
- Static and environmental control

Reliability

ICO's outgoing electrical defect rate on packaged parts is less than 500 ppm. Our goal is to achieve a defect rate of less than 50 ppm within the next two years.

The failure rate on the SH3 process is less than 100 FITS. (g)