

PRODUCT SPECIFICATIONS

SMALL SIGNAL TRANSISTORS

7597360 RAYTHEON. SEMICONDUCTOR

94D 05535

D

7-35-17

RAYTHEON

High Current, High Speed
Switches

CK

NPN

Description

The CK is a gold doped transistor useful for high current, high speed switching and core driver applications. The PNP complement is the GK.

Dimensions

Die Size: 25 x 25 mils

Bonding Pad Size:

Base 4.2 mil Diameter

Emitter 4.2 mil Diameter

Popular
Types

2N3724/A

2N3725/A

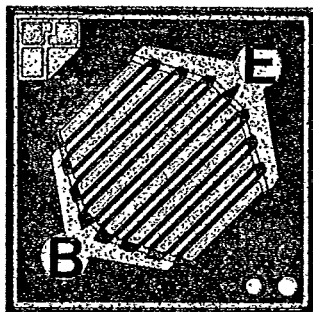
2N3735/JAN

2N3736

2N3737/JAN

2N4013

2N4014



Electrical Characteristics (at 25°C ambient temperature unless otherwise stated)

Parameter	Conditions	2N4013, 2N3724			2N4014, 2N3725			Units
		Min	Typ	Max	Min	Typ	Max	
BV _{CEO}	I _C = 10mA, I _E = 0	30	-47		50	56		Volts
BV _{CES}	I _C = 10μA, V _{EB} = 0	50	125		80	135		Volts
BV _{EBO}	I _E = 10μA, I _C = 0	6	7.8		8	7.8		Volts
I _{CES}	V _{CE} = 50V, V _{EB} = 0		0.2	10		0.3	10	μA
I _{CES}	V _{CE} = 80V, V _{EB} = 0							μA
H _{FE}	I _C = 10mA, V _{CE} = 1V	30	105		30	105		
H _{FE}	I _C = 100mA, V _{CE} = 1V	60	115	150	60	115	150	
H _{FE}	I _C = 100mA, V _{CE} = 1V, T _A = -55°C	30	70		30	70		
H _{FE}	I _C = 300mA, V _{CE} = 1V	40	95		40	90		
H _{FE}	I _C = 500mA, V _{CE} = 1V	35	65		35	60		
H _{FE}	I _C = 500mA, V _{CE} = 1V, T _A = -55°C	20	50		20	50		
H _{FE}	I _C = 800mA, V _{CE} = 2V	25	55		20	50		
H _{FE}	I _C = 1A, V _{CE} = 5V	30	65		25	60		
V _{CE(SAT)}	I _C = 10mA, I _B = 1mA		-0.14	-0.25		0.14	0.25	Volts
V _{CE(SAT)}	I _C = 100mA, I _B = 10mA		0.14	0.2		0.14	0.26	Volts
V _{CE(SAT)}	I _C = 300mA, I _B = 30mA		0.250	0.32		0.26	0.4	Volts
V _{CE(SAT)}	I _C = 500mA, I _B = 50mA		0.34	0.42		0.35	0.52	Volts
V _{CE(SAT)}	I _C = 800mA, I _B = 80mA		0.44	0.65		0.45	0.8	Volts
V _{CE(SAT)}	I _C = 1A, I _B = 100mA		0.55	0.75		0.6	0.95	Volts
V _{BE(SAT)}	I _C = 10mA, I _B = 1mA		0.67	0.76		0.67	0.76	Volts
V _{BE(SAT)}	I _C = 100mA, I _B = 10mA		0.77	0.86		0.77	0.86	Volts
V _{BE(SAT)}	I _C = 300mA, I _B = 30mA		0.86	1.1		0.86	1.1	Volts
V _{BE(SAT)}	I _C = 500mA, I _B = 50mA	0.8	0.92	1.1	0.8	0.92	1.1	Volts
V _{BE(SAT)}	I _C = 800mA, I _B = 80mA		1.0	1.5		1.0	1.5	Volts
V _{BE(SAT)}	I _C = 1A, I _B = 100mA		1.1	1.65		1.1	1.65	Volts
t _{he}	I _C = 50mA, V _{CE} = 10V, f = 100MHz	3	3.9		3	3.9		nS
t _{on}	I _C = 500mA, I _{B1} = 50mA (see Fig. 1)		15	35		15	35	nS
t _{off}	I _C = 500mA, I _{B1} = 50mA (see Fig. 1)		50	60		50	60	nS
C _{ob}	I _E = 0, V _{CB} = 10V		3.5	12		3.5	10	pF
C _{ib}	I _C = 0, V _{EB} = 0.5V		40	55		40	55	pF

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T-35-17

High Current, High Speed Switches

CK Single Transistors

Product Type	Pkg.	Electrical Parameters @ 25°C Ambient Temperature							f _t MHz	C _{ob} pF	t _{off} nS
		BV _{CEO}	BV _{CEO}	BV _{CEO}	H _{FE} @ I _C /V _{CE}		V _{CE(SAT)} @ I _C /I _B				
		Min	Min	Min			Volts				
		@ 10μA	@ 10mA	@ 10μA	Min/Max	mA/V	Max	mA/mA	Min	Max	Max
2N3252	T0-5	60	30	5	30/-	150/1	0.3	150/15	200	12	70
2N3253	T0-5	75	40	5	25/-	150/1	0.35	150/15	175	12	70
2N3253J	T0-5	75	40	5	25/-	150/1	0.35	150/15	175	12	70
2N3444	T0-5	80	50	5	20/-	150/1	0.35	150/15	150	12	70
2N3444J	T0-5	80	50	5	20/-	150/1	0.35	150/15	175	12	70
2N3554	T0-5	60	30	5	25/-	100/1	0.7	750/75	150	25	105
2N3772	T0-5	80	60	6	40/150	100/1	0.22	100/10	300	10	100
2N3724	T0-5	50	30	6	60/150	100/1	0.2	100/10	300	12	60
2N3724A	T0-5	50	30	6	60/150	100/1	0.2	100/10	300	12	60
2N3725	T0-5	80	50	6	60/150	100/1	0.26	100/10	300	12	60
2N3725A	T0-5	80	50	6	60/150	100/1	0.26	100/10	300	12	60
2N3734	T0-5	50	30	5	40/-	150/1	0.3	150/15	300	9	60
2N2735	T0-5	75	50	5	40/-	150/1	0.3	150/15	250	9	60
2N3735J,TX,V	T0-5	75	50	5	40/-	150/1	0.3	150/15	250	9	60
2N3736	T0-46	50	30	5	40/-	150/1	0.3	150/15	300	9	60
2N3737	T0-46	75	50	5	40/-	150/1	0.3	150/15	250	9	60
2N3737J,TX,V	T0-46	75	50	5	40/-	150/1	0.3	150/15	250	9	60
2N3830	T0-5	80	50	5	30/-	150/1	0.3	150/15	200	12	70
2N3831	T0-5	70	40	5	35/-	150/1	0.3	150/15	200	12	70
2N4013	T0-18	50	30	6	60/150	100/1	0.2	100/10	300	12	60
2N4014	T0-18	80	50	6	60/150	100/1	0.26	100/10	300	10	60
2N4046	T0-5	50	30	6	40/150	100/1	0.2	100/10	250	12	60
2N4047	T0-5	80	50	6	40/150	100/1	0.26	100/10	250	10	60

CK Quad Transistors

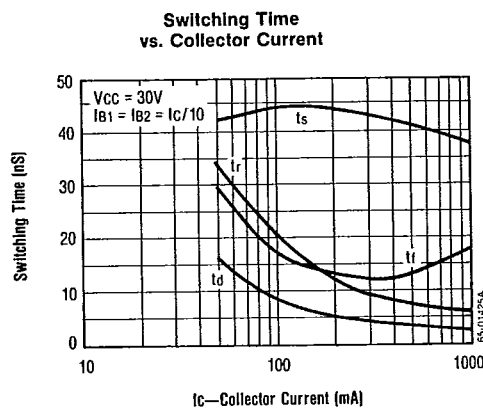
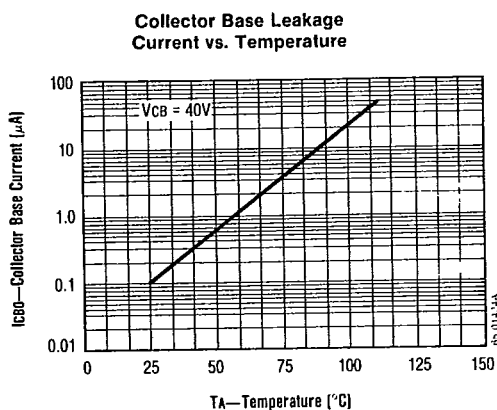
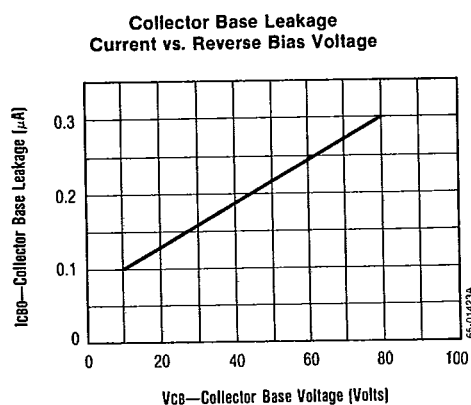
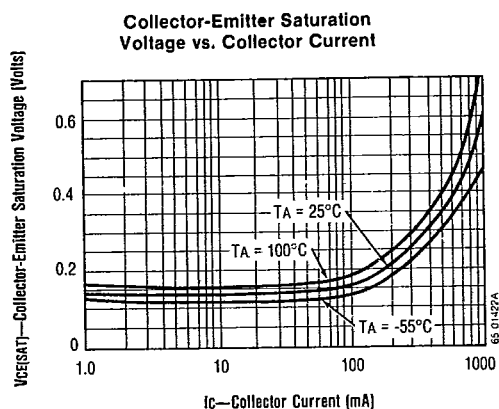
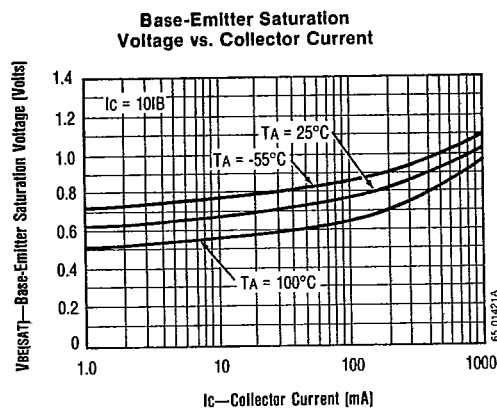
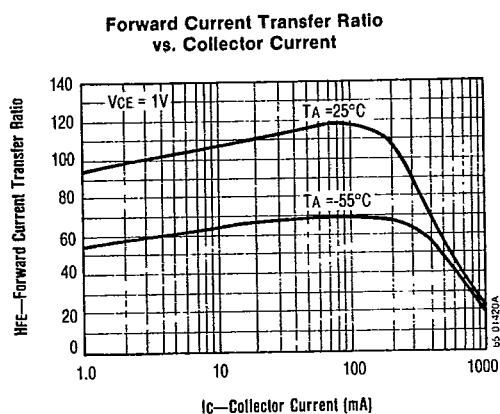
Product Type	Pkg.	Electrical Parameters @ 25°C Ambient Temperature							f _t MHz	C _{ob} pF	t _{off} nS
		BV _{CEO}	BV _{CEO}	BV _{CEO}	H _{FE} @ I _C /V _{CE}		V _{CE(SAT)} @ I _C /I _B				
		Min	Min	Min							
		@ 10μA	@ 10mA	@ 10μA	Min/Max	mA/V	Volts Max	mA/mA	Min	Max	Max
SP3724QD	T0-116	50	30	6	60/150	100/1	0.2	100/10	300	12	60
SP3724QDB	T0-116	50	30	6	60/150	100/1	0.2	100/10	300	12	60
SP3724QF	T0-86	50	30	6	60/150	100/1	0.2	100/10	300	12	60
SP3725QD	T0-116	80	50	6	60/150	100/1	0.26	100/10	300	12	60
SP3725QDB	T0-116	80	50	6	60/150	100/1	0.26	100/10	300	12	60
SP3725QF	T0-86	80	50	6	60/150	100/1	0.26	100/10	300	12	60

QD = QUAD DIP (CERAMIC); QDB = QUAD DIP (PLASTIC); QF = QUAD FLATPAK

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High Current, High Speed Switches

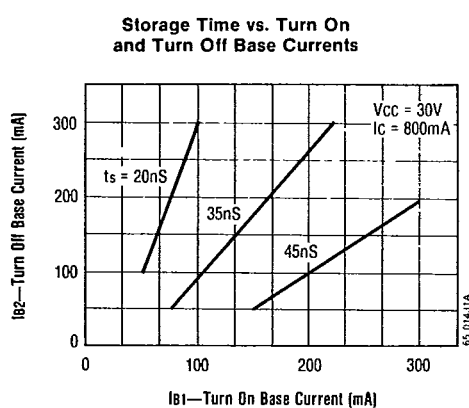
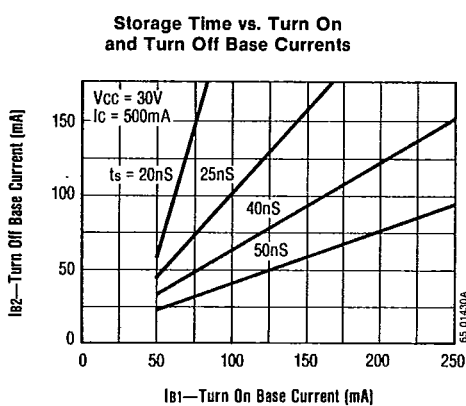
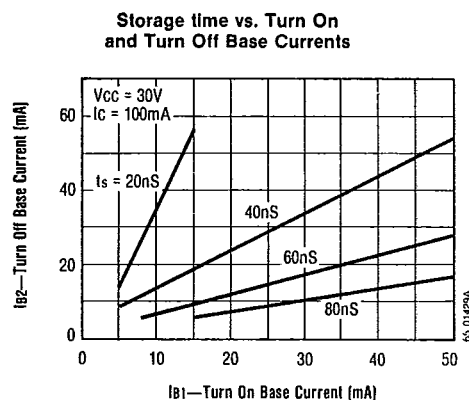
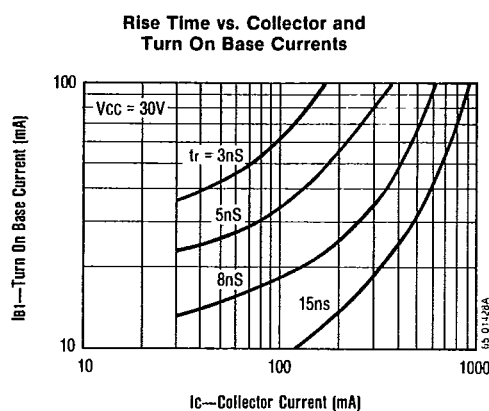
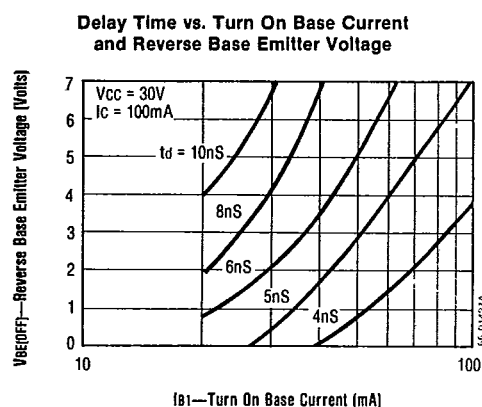
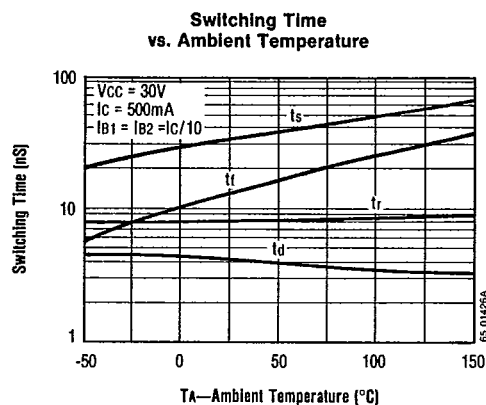
Typical Performance Characteristics



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High Current, High Speed Switches

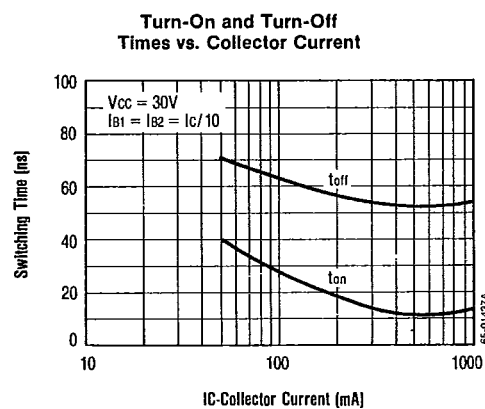
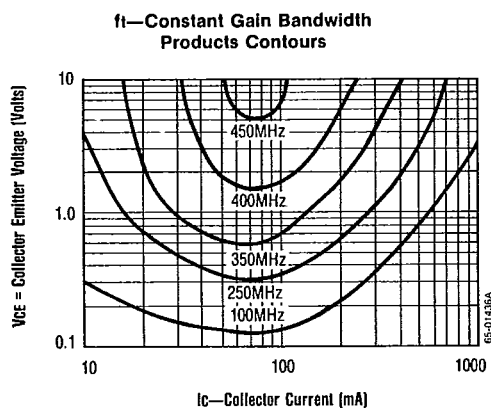
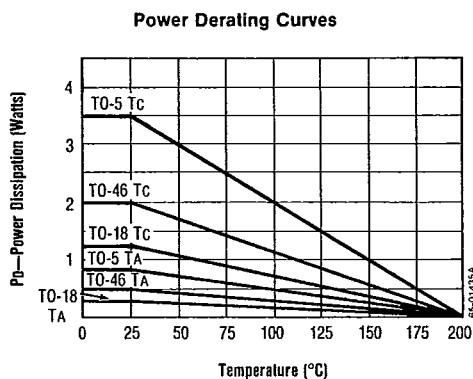
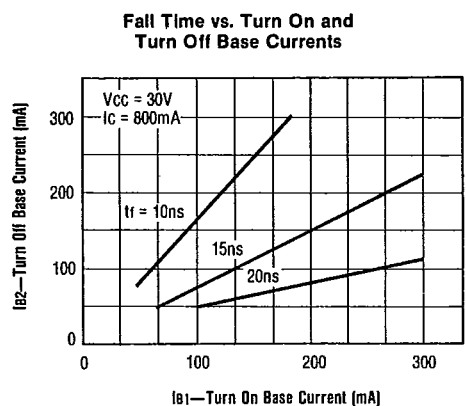
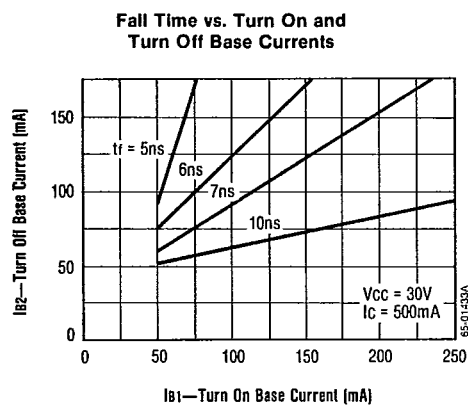
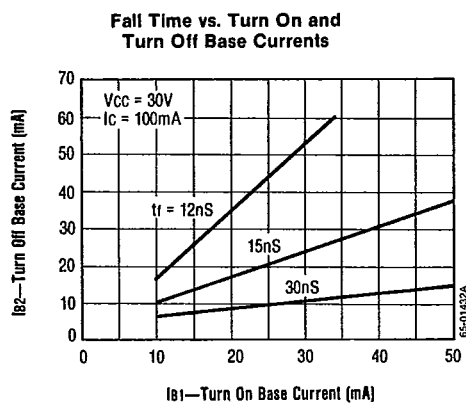
Typical Performance Characteristics (Continued)



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High Current, High Speed Switches

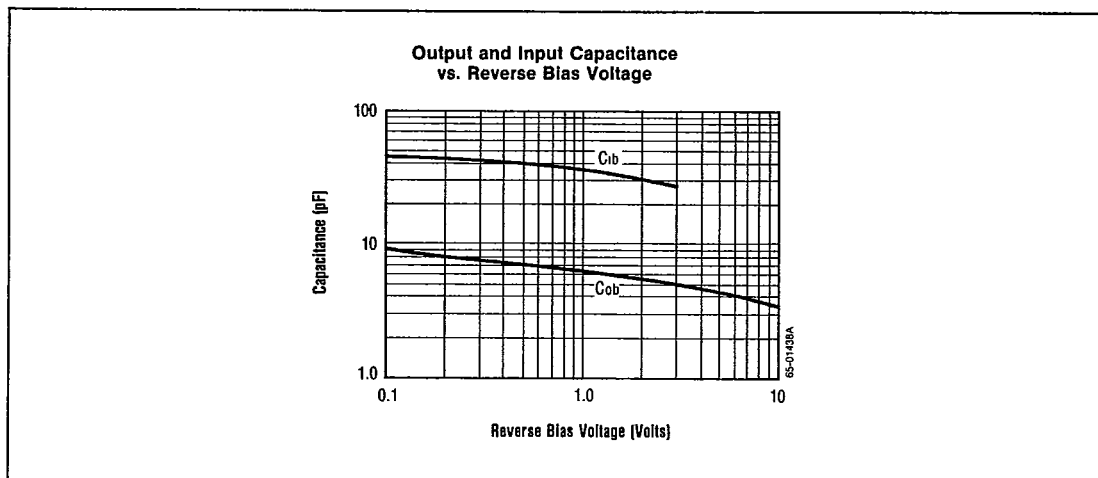
Typical Performance Characteristics (Continued)



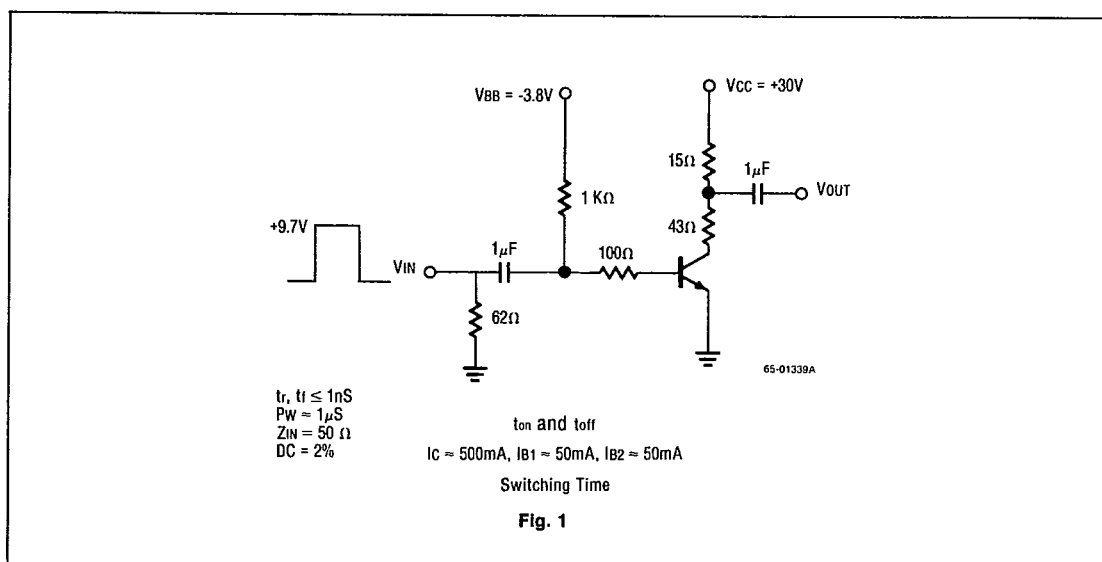
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High Current, High Speed Switches

Typical Performance Characteristics (Continued)



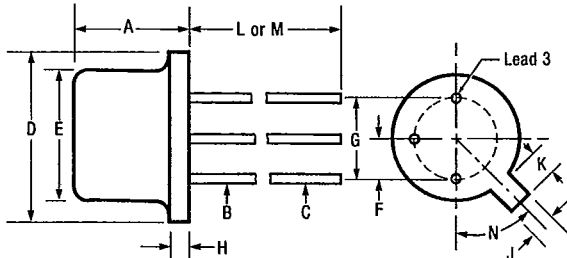
Switching Measurement Circuits



High Current, High Speed Switches

Packaging Information

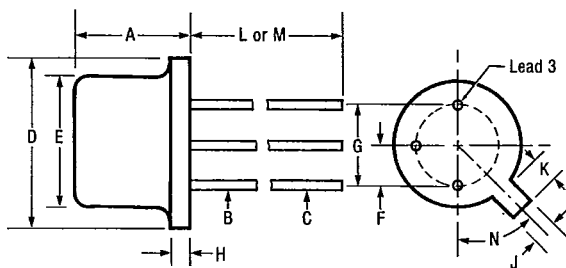
In accordance with
JEDEC (TO-5) outline
(60 mil Kovar or Steel Header)



Notes: Lead No. 3 internally connected to case.
Can material is nickel.

Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	.240	.260	6.09	6.60
B	.016	.019	.41	.48
C	.016	.021	.41	.53
D	.335	.370	8.51	9.40
E	.305	.335	7.75	8.51
F	.100BSC		2.54BSC	
G	.200BSC		5.08BSC	
H	.009	.125	.22	3.17
J	.028	.034	.71	.86
K	.029	.045	.73	1.14
L	.500		12.70	
M	1.500		38.10	
N	45° BSC		45° BSC	

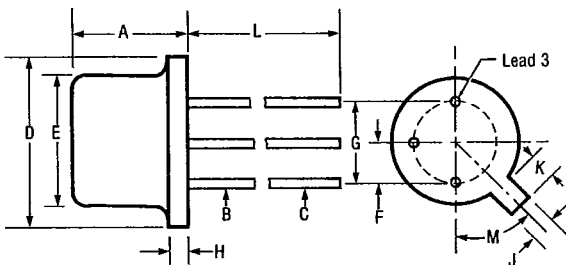
In accordance with
JEDEC (TO-18) outline
(8 mil Kovar Header)



Notes: Lead No. 3 internally connected to case.
Can material is nickel.

Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	.170	.210	4.31	5.33
B	.016	.019	.41	.48
C	.016	.021	.41	.53
D	.209	.230	5.30	5.84
E	.178	.195	4.52	4.95
F	.050BSC		1.27BSC	
G	.100BSC		2.54BSC	
H		.030		.76
J	.036	.046	.91	1.16
K	.028	.048	.71	1.21
L	.500		12.70	
M	1.500		38.10	
N	45° BSC		45° BSC	

In accordance with
JEDEC (TO-46) outline
(45 mil Kovar Header)



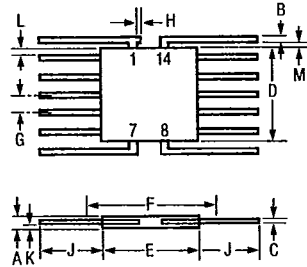
Notes: Lead No. 3 internally connected to case.
Can material is nickel.

Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	.065	.085	1.65	2.15
B	.012	.019	.30	.48
C	.012	.021	.30	.53
D	.209	.230	5.30	5.84
E	.178	.195	4.52	4.95
F	.050BSC		1.27BSC	
G	.100BSC		2.54BSC	
H		.040		1.02
J	.036	.046	.91	1.16
K	.028	.048	.71	1.21
L	.500		12.70	
M	45° BSC		45° BSC	

High Current, High Speed Switches

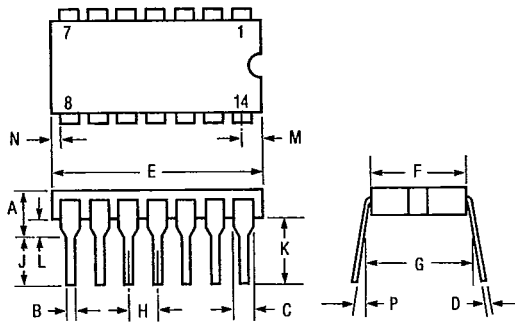
Packaging Information (Continued)

In accordance with
JEDEC (TO-86) Outline
14 Lead Flatpak



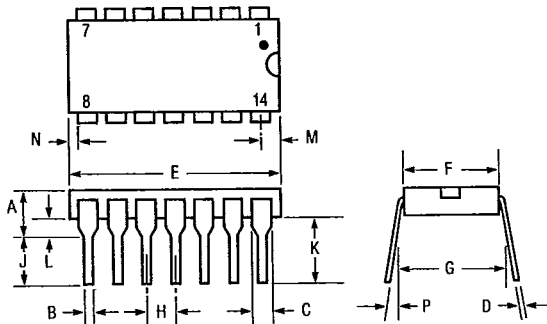
Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.030	0.070	0.76	1.77
B	0.010	0.019	0.25	0.48
C	0.003	0.006	0.08	0.15
D	0.240	0.275	6.10	6.99
E	0.240	0.260	6.10	6.60
F		0.290		7.37
G	0.050BSC		1.27BSC	
H	0.008	0.015	0.20	0.38
J	0.070		1.78	
K	0.005	0.035	0.13	0.89
L	0.005		0.13	
M	0.004		0.10	

Similar to
JEDEC (TO-116) Outline
14 Lead Ceramic Dual-in-Line



Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A		200		5.08
B	.014	.023	0.36	0.58
C	.030	.070	0.76	1.78
D	.008	.015	0.20	0.38
E		.785		19.94
F	.220	.310	5.59	7.87
G	.290	.320	7.37	8.13
H	.100BSC		2.54BSC	
J	.125	.200	3.18	5.08
K	.150		3.81	
L	.015	.060	0.38	1.52
M		.098		2.49
N	.005		0.13	
P	0°	15°	0°	15°

In accordance with
JEDEC (TO-116) Outline
14-Lead Plastic Dual-in-Line



Dimension	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A		0.200		5.08
B	0.015	0.023	0.381	0.584
C	0.030	0.070	0.77	1.77
D	0.008	0.015	0.204	0.381
E	0.660	0.785	16.76	19.94
F	0.220	0.280	5.59	7.11
G	0.290	0.310	7.37	7.87
H	0.100BSC		2.54BSC	
J	0.100		2.54	
K	0.120		3.05	
L	0.020		0.51	
M	0.020	0.102	0.51	2.59
N	0.002	0.087	0.051	2.21
P	0°	15°	0°	15°