

General Purpose Transistor

- We declare that the material of product compliance with RoHS requirements.

ORDERING INFORMATION

Device	Marking	Shipping
METR4401-G	2X	3000/Tape & Reel

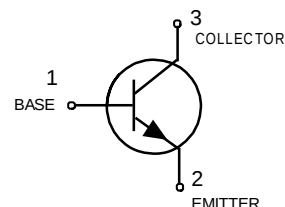
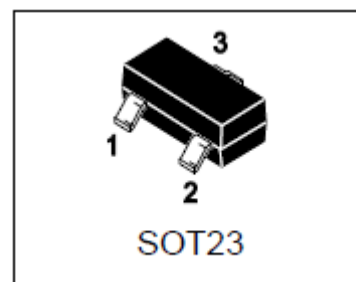
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	40	Vdc
Collector–Base Voltage	V_{CBO}	60	Vdc
Emitter–Base Voltage	V_{EBO}	6.0	Vdc
Collector Current — Continuous	I_C	600	mAdc
Collector Current — Peak	ICM	900	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR– 5 Board, (1) $T_A = 25^\circ\text{C}$	P_D	225	mW
Derate above 25°C		1.8	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	–55 to +150	$^\circ\text{C}$

1. FR–5 = 1.0×0.75×0.062 in.



ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage(3) ($I_C = 1.0 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CEO}$	40	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 0.1 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	60	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 0.1 \text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current ($V_{CE} = 35 \text{ Vdc}$, $V_{EB} = 0.4 \text{ Vdc}$)	I_{BEV}	—	0.1	μAdc
Collector Cutoff Current ($V_{CE} = 35 \text{ Vdc}$, $V_{EB} = 0.4 \text{ Vdc}$)	I_{CEX}	—	0.1	μAdc

1. FR–5 = 1.0 × 0.75 × 0.062 in.

2. Alumina = 0.4 × 0.3 × 0.024 in. 99.5% alumina.

3. Pulse Test: Pulse Width <300 μs ; Duty Cycle <2.0%.

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (3)				
($I_C = 0.1\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$)		20	—	
($I_C = 1.0\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$)		40	—	
($I_C = 10\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$)		80	—	
($I_C = 150\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$)		100	300	
($I_C = 500\text{ mA}$, $V_{CE} = 2.0\text{ Vdc}$)		40	—	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$)		—	0.4	
($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$)		—	0.75	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$)		0.75	0.95	
($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$)		—	1.2	

SMALL-SIGNAL CHARACTERISTICS

Current–Gain—Bandwidth Product ($I_C = 20\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	250	—	MHz
Collector–Base Capacitance ($V_{CB} = 5.0\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{cb}	—	6.5	pF
Emitter–Base Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$)	C_{eb}	—	30	pF
Input Impedance ($V_{CE} = 10\text{ Vdc}$, $I_C = 1.0\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{ie}	1.0	15	k Ω
Voltage Feedback Ratio ($V_{CE} = 10\text{ Vdc}$, $I_C = 1.0\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{re}	0.1	8.0	$\times 10^{-4}$
Small–Signal Current Gain ($V_{CE} = 10\text{ Vdc}$, $I_C = 1.0\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{fe}	40	500	—
Output Admittance ($V_{CE} = 10\text{ Vdc}$, $I_C = 1.0\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{oe}	1.0	30	μmhos

SWITCHING CHARACTERISTICS

Delay Time	($V_{CC} = 30\text{ Vdc}$, $V_{EB} = 2.0\text{ Vdc}$)	t_d	—	15	ns
Rise Time	($I_C = 150\text{ mA}$, $I_{B1} = 15\text{ mA}$)	t_r	—	20	
Storage Time	($V_{CC} = 30\text{ Vdc}$, $I_C = 150\text{ mA}$)	t_s	—	225	ns
Fall Time	($I_{B1} = I_{B2} = 15\text{ mA}$)	t_f	—	30	

3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$; Duty Cycle $\leq 2.0\%$.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

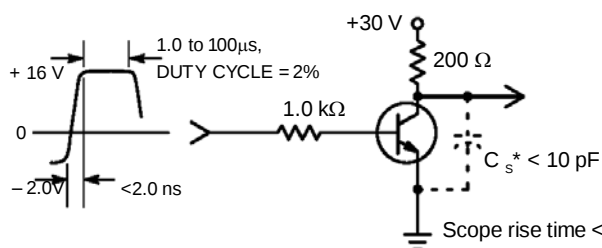


Figure 1. Turn–On Time

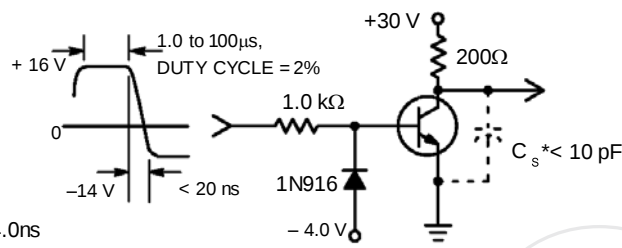
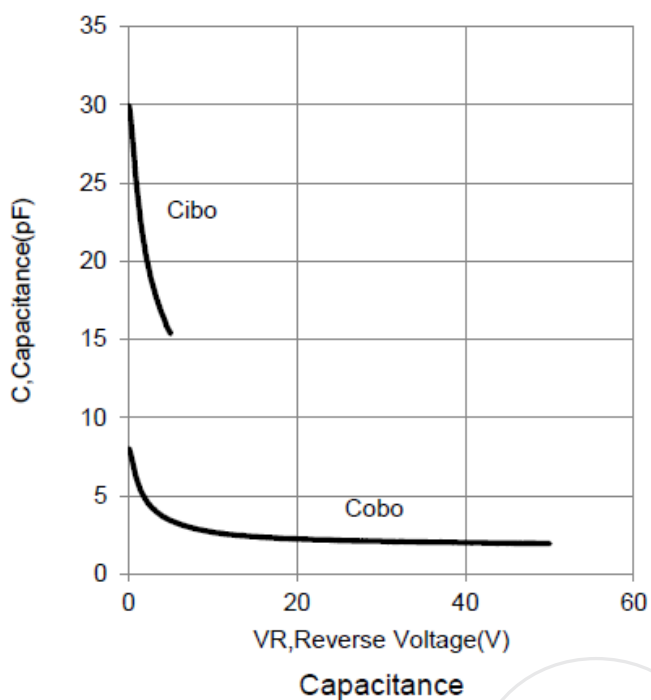
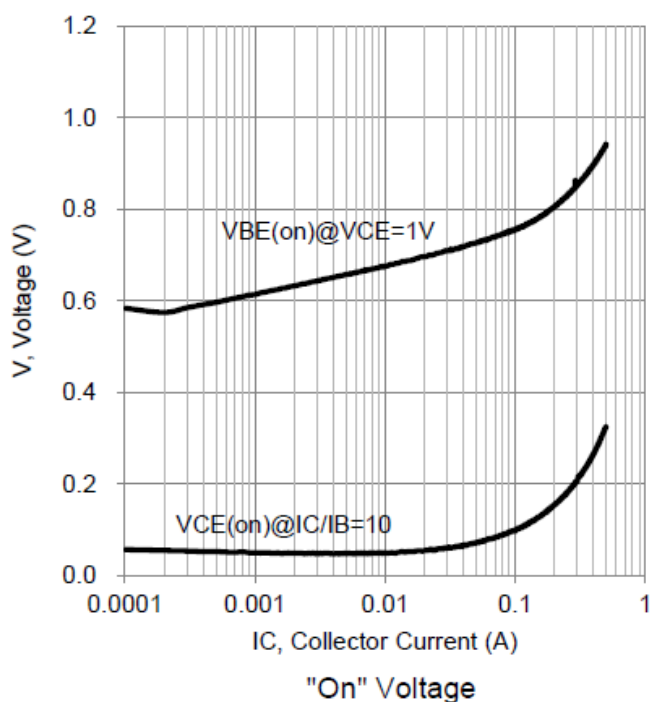
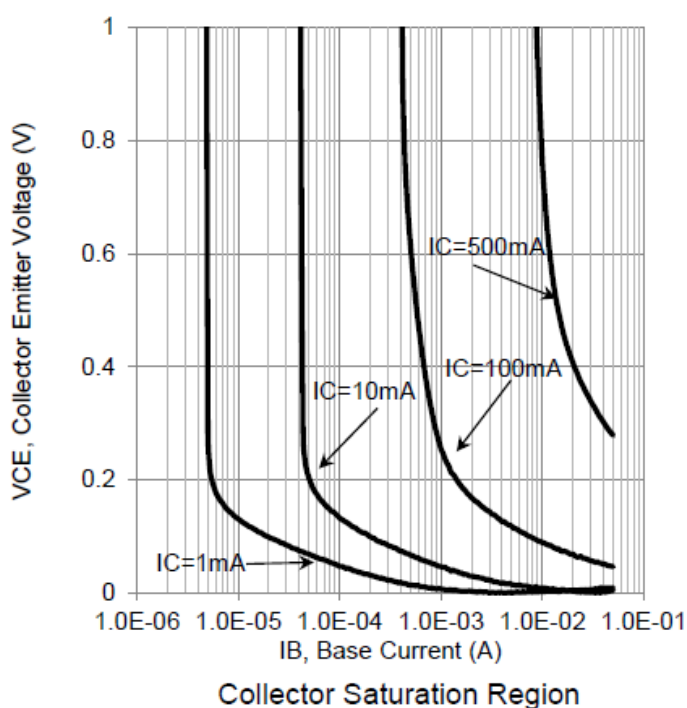
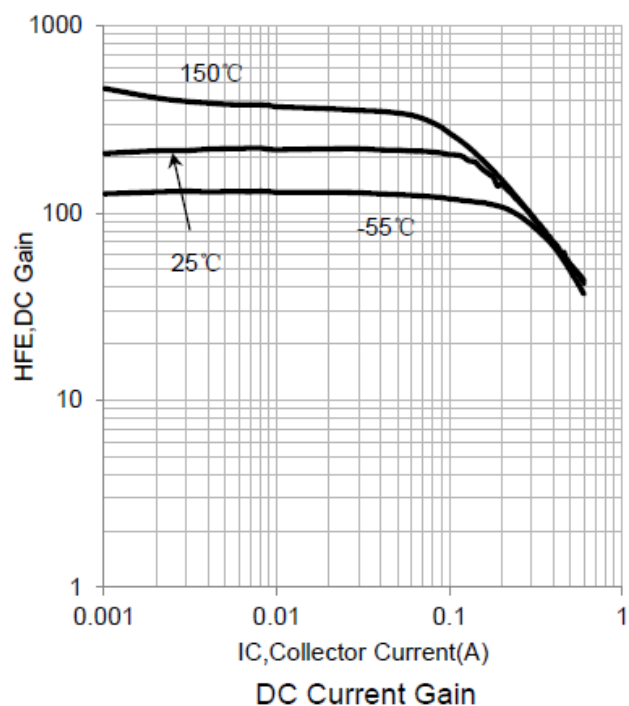


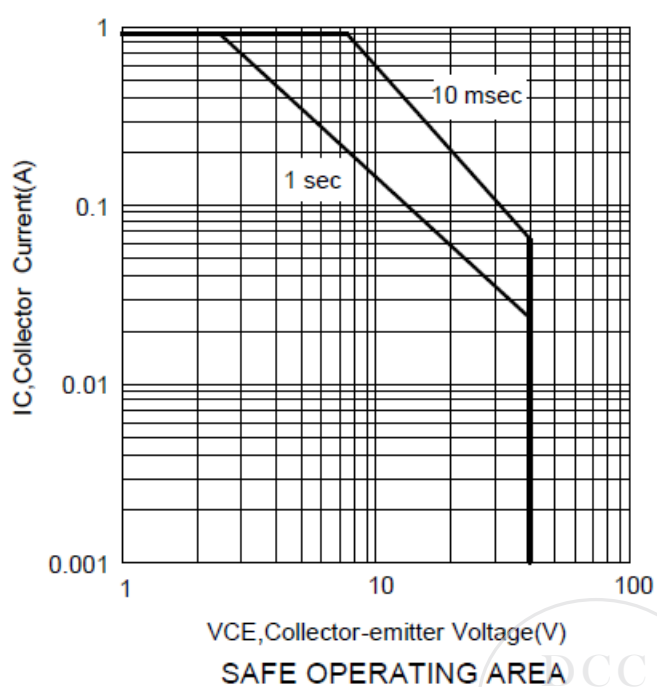
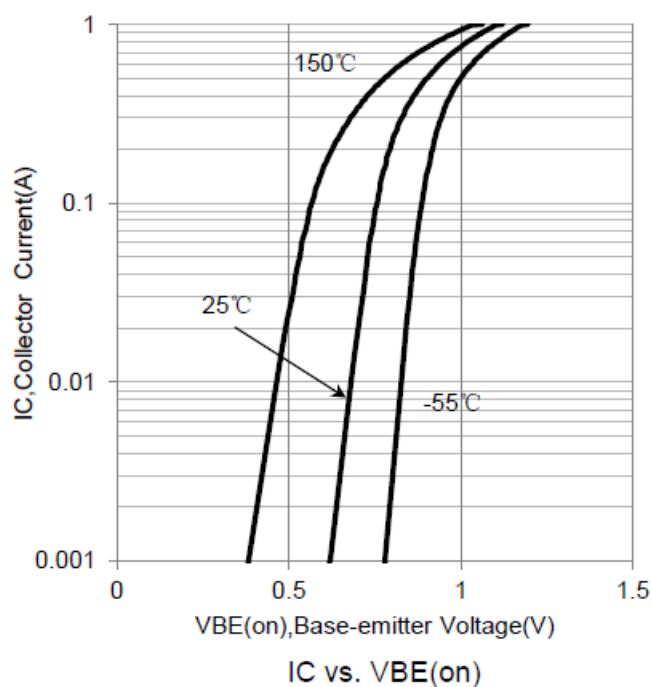
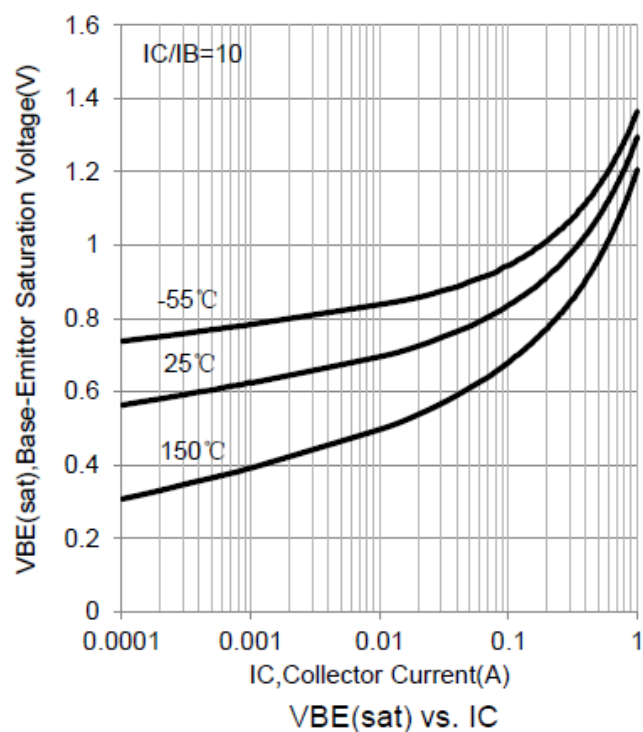
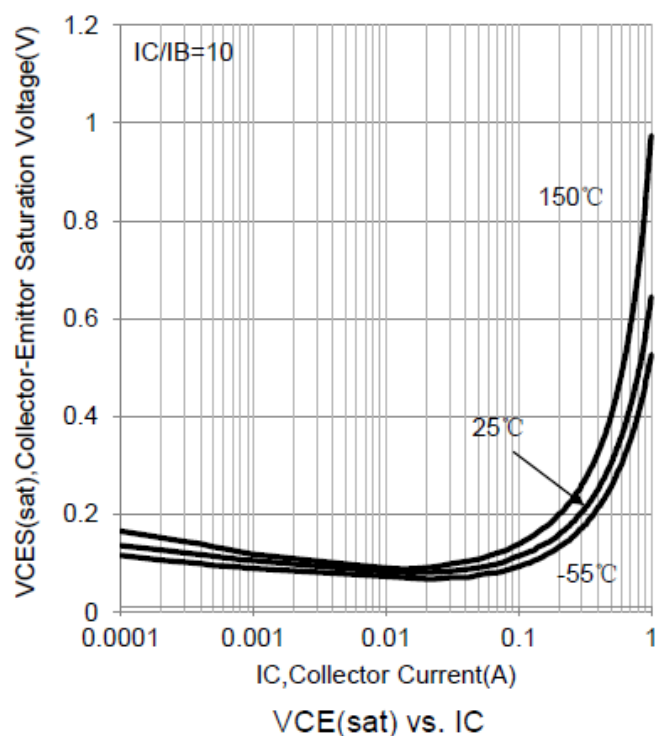
Figure 2. Turn–Off Time

*Total shunt capacitance of test jig connectors, and oscilloscope

ELRCTRICAL CHARACTERISTICS CURVES



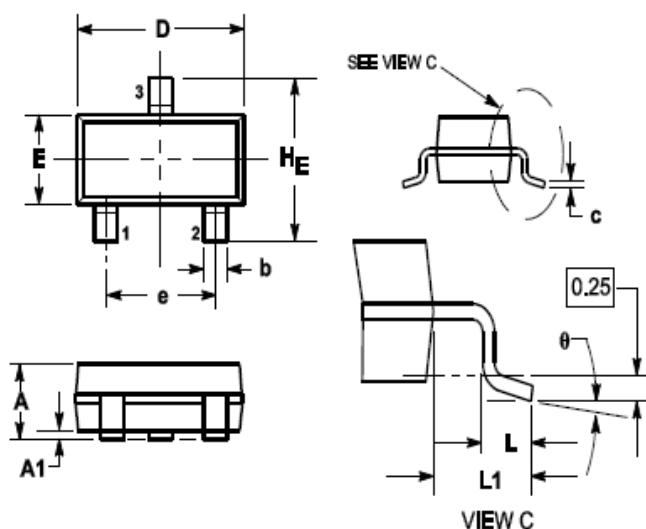
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OUTLINE AND DIMENSIONS

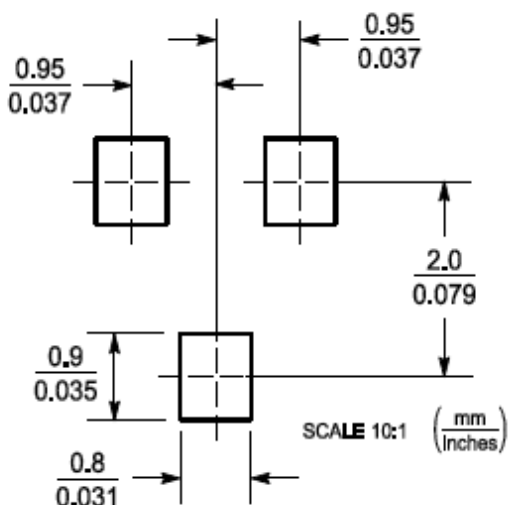
Notes:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1	1.11	0.035	0.04	0.044
A1	0.01	0.06	0.1	0.001	0.002	0.004
b	0.37	0.44	0.5	0.015	0.018	0.02
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.9	3.04	0.11	0.114	0.12
E	1.20	1.3	1.4	0.047	0.051	0.055
e	1.78	1.9	2.04	0.07	0.075	0.081
L	0.10	0.2	0.3	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H _E	2.10	2.4	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°

SOLDERING FOOTPRINT

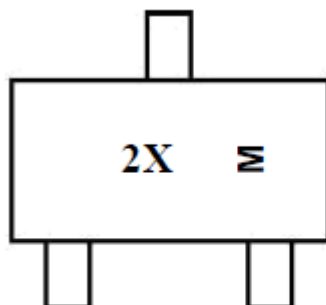


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Device name:METR4401-G

Package:SOT-23

Marking Code:



2X: Device Marking Code

M: Date Code

MONTH CODE

ODD YEARS(2009,2011)

Jan	1
Feb	2
Mar	3
Apr	4
May	5
Jun	6
Jul	7
Aug	8
Sep	9
Oct	T
Nov	V
Dec	C

EVEN YEARS(2010,2012)

Jan	E
Feb	F
Mar	H
Apr	J
May	K
Jun	L
Jul	N
Aug	P
Sep	U
Oct	X
Nov	Y
Dec	Z

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