

# Bipolar Transistor

**-12 V, -1 A, Low  $V_{CE(sat)}$   
PNP Single MCPH3**

**12A02MH**

## Features

- Large Current Capacity
- Low Collector-To-Emitter Saturation Voltage (Resistance)  
 $R_{CE(sat)}$  typ. = 285 m $\Omega$  [ $I_C = 1$  A,  $I_B = 50$  mA]
- Small ON-Resistance ( $R_{on}$ )
- This Device is Pb-Free

## Applications

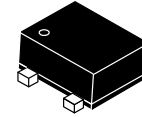
- Low-Frequency Amplifier, High-Speed Switching, Small Motor Drive, Muting Circuit

## ABSOLUTE MAXIMUM RATINGS

(Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.)

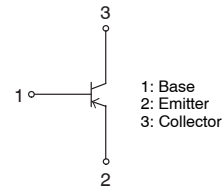
Symbol	Parameter	Conditions	Ratings	Unit
$V_{CBO}$	Collector-Base Voltage		-15	V
$V_{CEO}$	Collector-Emitter Voltage		-12	V
$V_{EBO}$	Emitter-Base Voltage		-5	V
$I_C$	Collector Current		-1	A
$I_{CP}$	Collector Current (Pulse)		-2	A
$P_C$	Collector Dissipation	When mounted on ceramic substrate (600 mm <sup>2</sup> × 0.8 mm)	600	mW
$T_J$	Junction Temperature		150	°C
$T_{STG}$	Storage Temperature Range		-55 to 150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

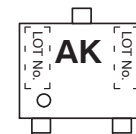


MCPH3  
CASE 419AQ

## ELECTRICAL CONNECTION



## MARKING DIAGRAM



AK = Device Code

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
12A02MH-TL-E	MCPH3 (Pb-Free)	3000 / Tape & Reel

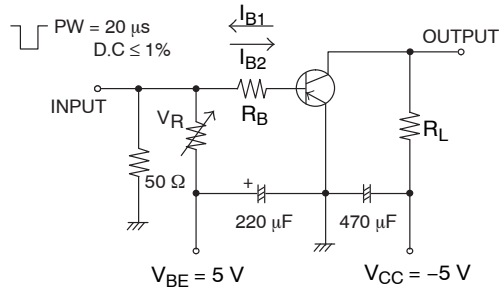
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# 12A02MH

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	Collector Cut-Off Current	$V_{CB} = -12\text{ V}, I_E = 0\text{ A}$	-	-	-100	nA
$I_{EBO}$	Emitter Cut-Off Current	$V_{EB} = -4\text{ V}, I_C = 0\text{ A}$	-	-	-100	nA
$h_{FE}$	DC Current Gain	$V_{CE} = -2\text{ V}, I_C = -10\text{ mA}$	300	-	700	-
$f_T$	Gain-Bandwidth Product	$V_{CE} = -2\text{ V}, I_C = -50\text{ mA}$	-	450	-	MHz
$C_{ob}$	Output Capacitance	$V_{CB} = -10\text{ V}, f = 1\text{ MHz}$	-	6	-	pF
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = -400\text{ mA}, I_B = -20\text{ mA}$	-	-120	-240	mV
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = -400\text{ mA}, I_B = -20\text{ mA}$	-	-0.9	-1.2	V
$V_{(BR)CBO}$	Collector-to-Base Breakdown Voltage	$I_C = -10\text{ }\mu\text{A}, I_E = 0\text{ A}$	-15	-	-	V
$V_{(BR)CEO}$	Collector-to-Emitter Breakdown Voltage	$I_C = -1\text{ mA}, R_{BE} = \infty$	-12	-	-	V
$V_{(BR)EBO}$	Emitter-to-Base Breakdown Voltage	$I_E = -10\text{ }\mu\text{A}, I_C = 0\text{ A}$	-5	-	-	V
$t_{on}$	Turn-ON Time	See Figure. 1	-	30	-	ns
$t_{stg}$	Storage Time		-	75	-	ns
$t_f$	Fall Time		-	15	-	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



$$I_C = 20\text{ mA}, I_{B1} = -20\text{ mA}, I_{B2} = -400\text{ mA}$$

**Figure 1. Switching Time Test Circuit**

TYPICAL CHARACTERISTICS

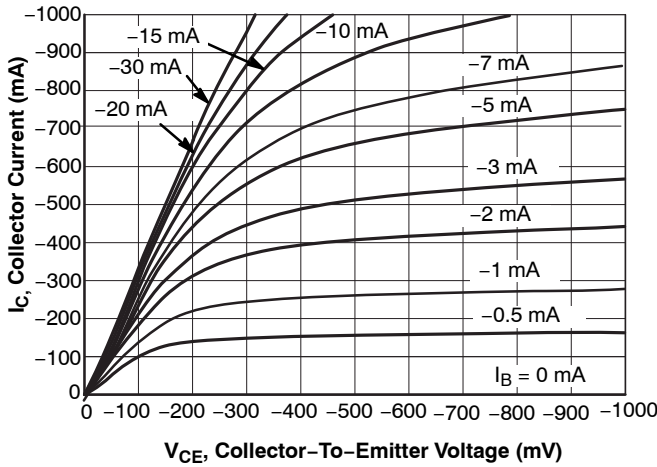


Figure 2.  $I_C - V_{CE}$

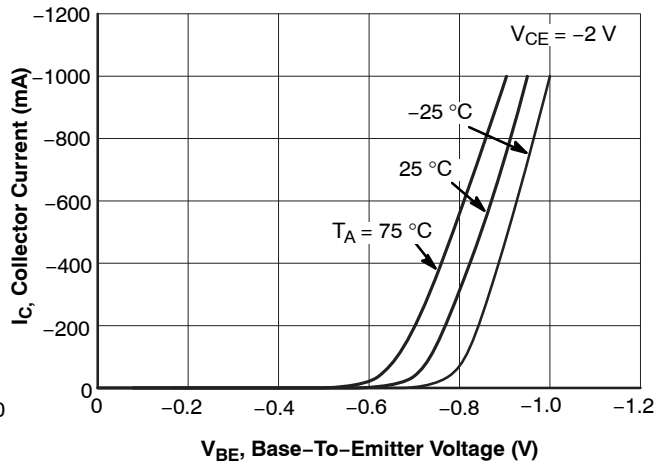


Figure 3.  $I_C - V_{BE}$

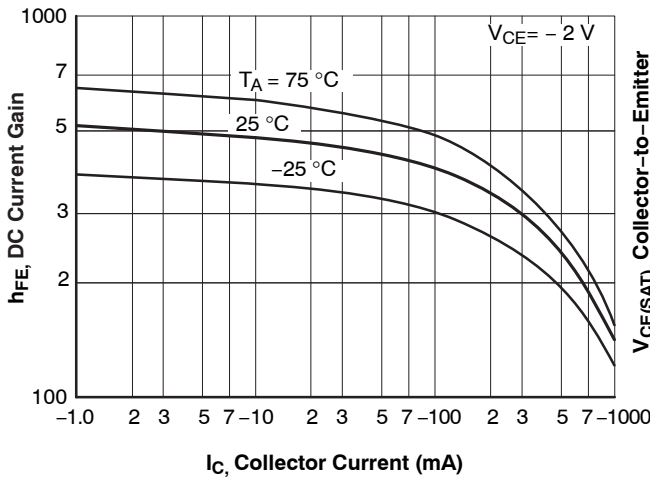


Figure 4.  $h_{FE} - I_C$

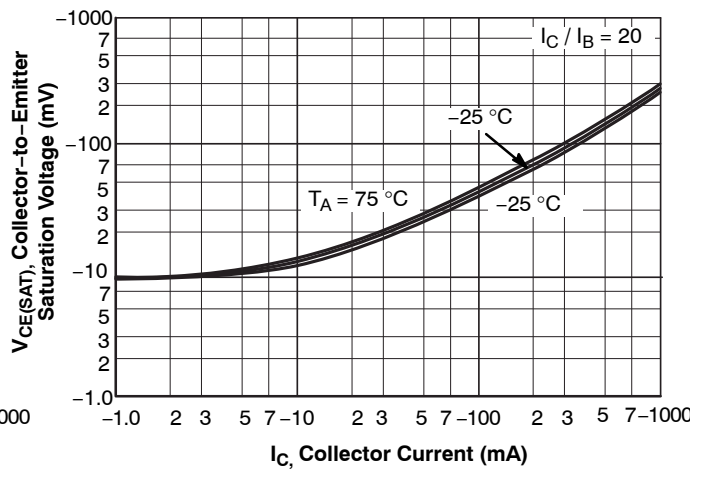


Figure 5.  $V_{CE(sat)} - I_C$

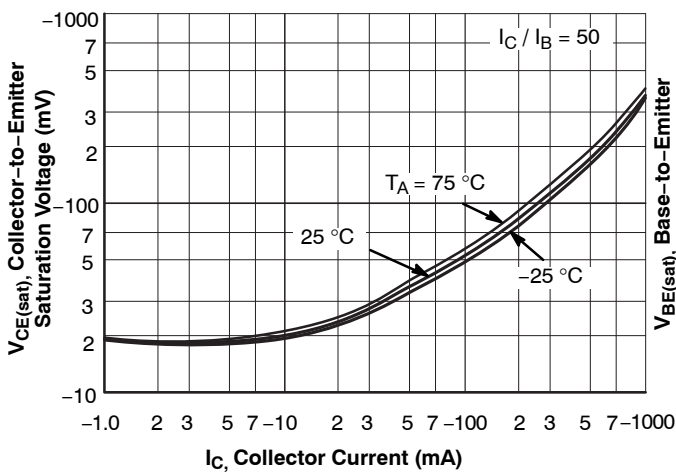


Figure 6.  $V_{CE(sat)} - I_C$

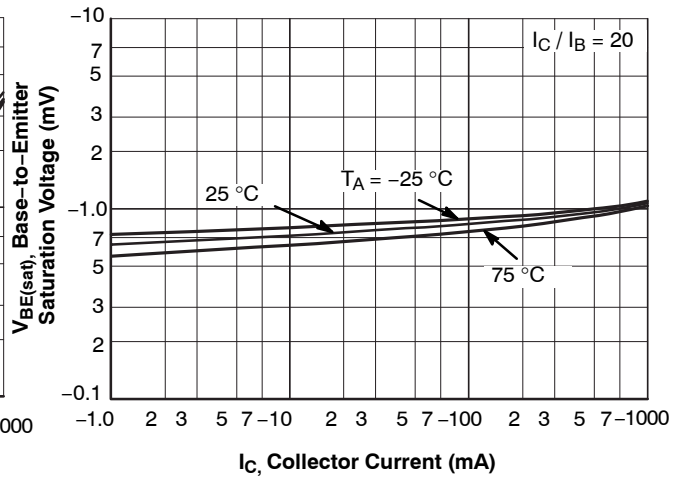


Figure 7.  $V_{BE(sat)} - I_C$

TYPICAL CHARACTERISTICS (continued)

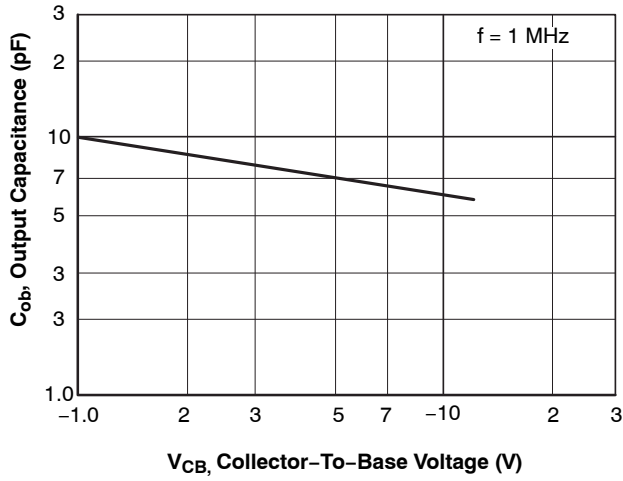


Figure 9.  $C_{ob} - V_C$

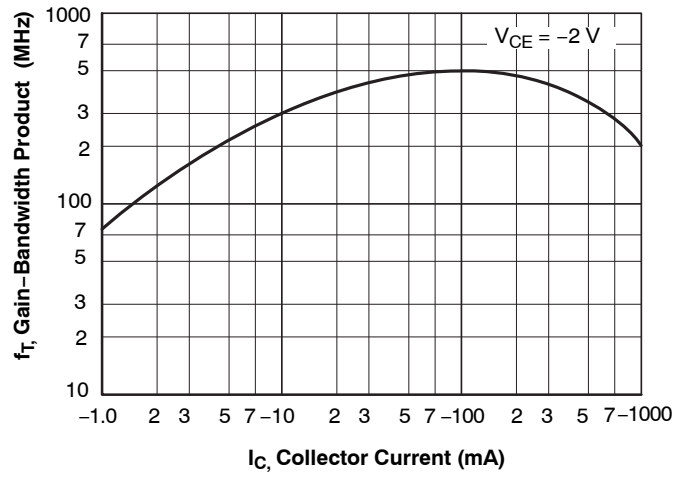


Figure 8.  $f_T - I_C$

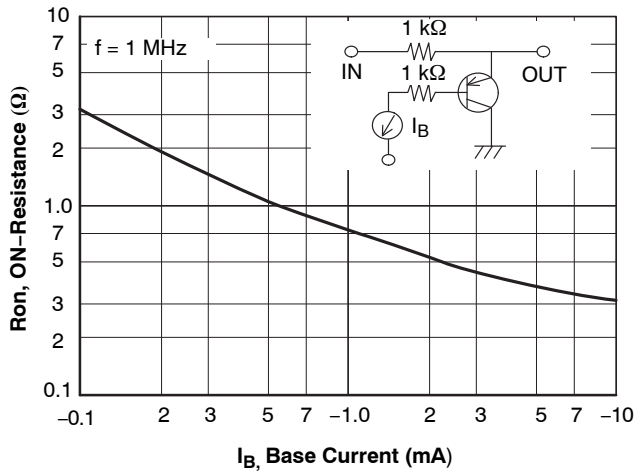


Figure 10.  $R_{on} - I_B$

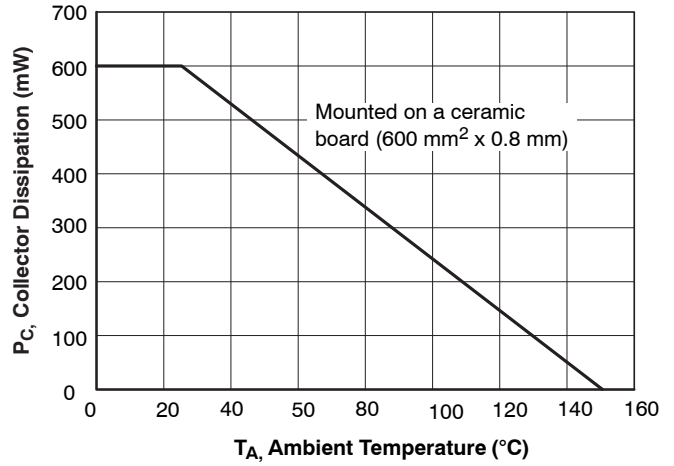
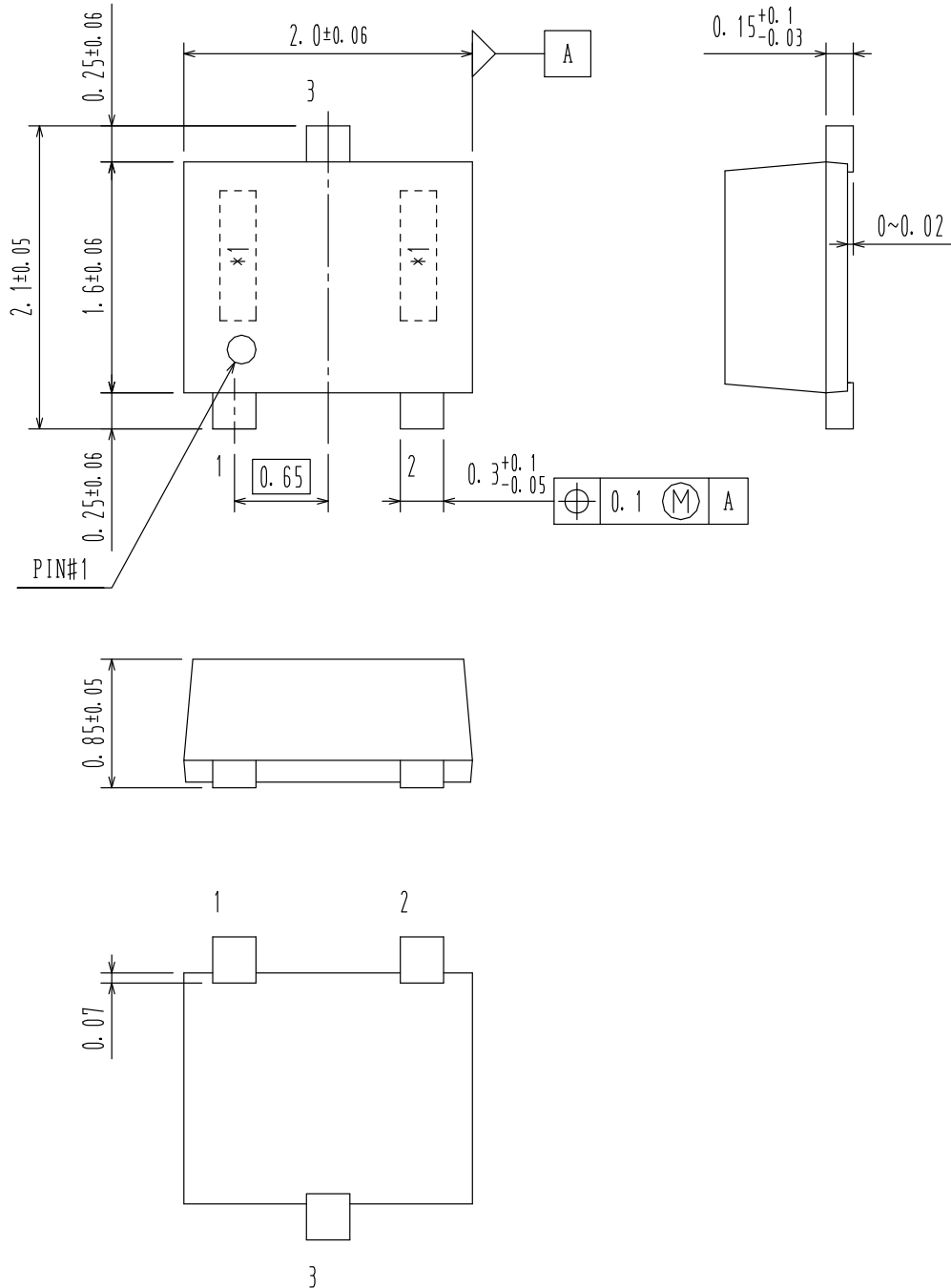


Figure 11.  $P_C - T_A$

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

**SC-70FL / MCPH3**  
**CASE 419AQ**  
**ISSUE O**

DATE 30 DEC 2011



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