

# 2N3773

## NPN Power Transistors

The 2N3773 is a PowerBase™ power transistor designed for high power audio, disk head positioners and other linear applications. This device can also be used in power switching circuits such as relay or solenoid drivers, DC-DC converters or inverters.

### Features

- High Safe Operating Area (100% Tested) 150 W @ 100 V
- Completely Characterized for Linear Operation
- High DC Current Gain and Low Saturation Voltage
  - $h_{FE} = 15$  (Min) @ 8.0 A, 4.0 V
  - $V_{CE(sat)} = 1.4$  V (Max) @  $I_C = 8.0$  A,  $I_B = 0.8$  A
- For Low Distortion Complementary Designs
- This is a Pb-Free Device

### MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Collector – Emitter Voltage	$V_{CEO}$	140	Vdc
Collector – Emitter Voltage	$V_{CEX}$	160	Vdc
Collector – Base Voltage	$V_{CBO}$	160	Vdc
Emitter – Base Voltage	$V_{EBO}$	7	Vdc
Collector Current	$I_C$		Adc
– Continuous		16	
– Peak (Note 2)		30	
Base Current	$I_B$		Adc
– Continuous		4	
– Peak (Note 2)		15	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	150 0.855	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–65 to +200	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Indicates JEDEC Registered Data.
2. Pulse Test: Pulse Width = 5 ms, Duty Cycle  $\leq 10\%$ .

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.17	$^\circ\text{C}/\text{W}$

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

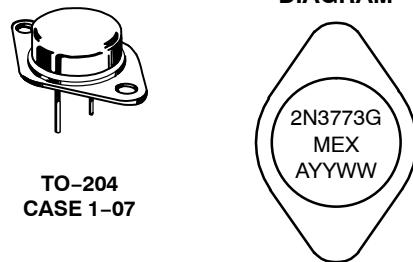


ON Semiconductor®

<http://onsemi.com>

16 A NPN  
POWER TRANSISTORS  
140 V, 150 W

### MARKING DIAGRAM



TO-204  
CASE 1-07

A = Assembly Location  
YY = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# 2N3773

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

Characteristic	Symbol	Min	Max	Unit
----------------	--------	-----	-----	------

### OFF CHARACTERISTICS (Note 3)

Collector-Emitter Breakdown Voltage (Note 4) ( $I_C = 0.2 \text{ Adc}$ , $I_B = 0$ )	$V_{CEO(\text{sus})}$	140	–	Vdc
Collector-Emitter Sustaining Voltage (Note 4) ( $I_C = 0.1 \text{ Adc}$ , $V_{BE(\text{off})} = 1.5 \text{ Vdc}$ , $R_{BE} = 100 \text{ Ohms}$ )	$V_{CEX(\text{sus})}$	160	–	Vdc
Collector-Emitter Sustaining Voltage ( $I_C = 0.2 \text{ Adc}$ , $R_{BE} = 100 \text{ Ohms}$ )	$V_{CER(\text{sus})}$	150	–	Vdc
Collector Cutoff Current (Note 4) ( $V_{CE} = 120 \text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	–	10	mAdc
Collector Cutoff Current (Note 4) ( $V_{CE} = 140 \text{ Vdc}$ , $V_{BE(\text{off})} = 1.5 \text{ Vdc}$ ) ( $V_{CE} = 140 \text{ Vdc}$ , $V_{BE(\text{off})} = 1.5 \text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )	$I_{CEX}$	– –	2 10	mAdc
Collector Cutoff Current ( $V_{CB} = 140 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	2	mAdc
Emitter Cutoff Current (Note 4) ( $V_{BE} = 7 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	5	mAdc

### ON CHARACTERISTICS (Note 3)

DC Current Gain ( $I_C = 8 \text{ Adc}$ , $V_{CE} = 4 \text{ Vdc}$ ) (Note 4) ( $I_C = 16 \text{ Adc}$ , $V_{CE} = 4 \text{ Vdc}$ )	$h_{FE}$	15 5	60 –	–
Collector-Emitter Saturation Voltage ( $I_C = 8 \text{ Adc}$ , $I_B = 800 \text{ mAdc}$ ) (Note 4) ( $I_C = 16 \text{ Adc}$ , $I_B = 3.2 \text{ Adc}$ )	$V_{CE(\text{sat})}$	– –	1.4 4	Vdc
Base-Emitter On Voltage (Note 4) ( $I_C = 8 \text{ Adc}$ , $V_{CE} = 4 \text{ Vdc}$ )	$V_{BE(\text{on})}$	–	2.2	Vdc

### DYNAMIC CHARACTERISTICS

Magnitude of Common-Emitter Small-Signal, Short-Circuit, Forward Current Transfer Ratio ( $I_C = 1 \text{ A}$ , $f = 50 \text{ kHz}$ )	$ h_{fe} $	4	–	–
Small-Signal Current Gain (Note 4) ( $I_C = 1 \text{ Adc}$ , $V_{CE} = 4 \text{ Vdc}$ , $f = 1 \text{ kHz}$ )	$h_{fe}$	40	–	–

### SECOND BREAKDOWN CHARACTERISTICS

Second Breakdown Collector Current with Base Forward Biased $t = 1 \text{ s}$ (non-repetitive), $V_{CE} = 100 \text{ V}$ , See Figure 12	$I_{S/b}$	1.5	–	Adc
---	-----------	-----	---	-----

3. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

4. Indicates JEDEC Registered Data.

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
2N3773G	TO-204 (Pb-Free)	100 Unit / Tray

<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.

## NPN

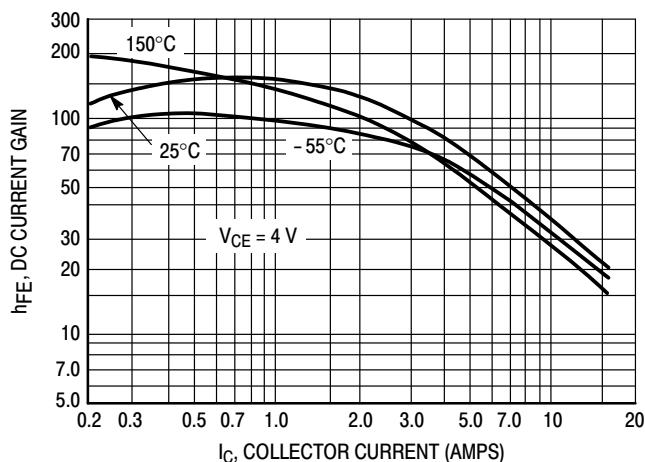


Figure 1. DC Current Gain

## PNP

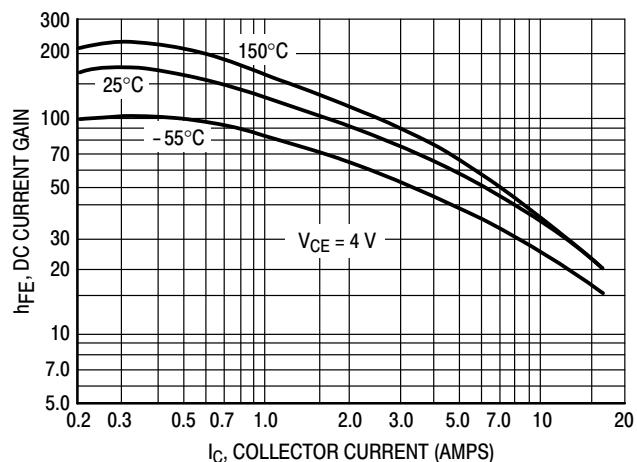


Figure 2. DC Current Gain

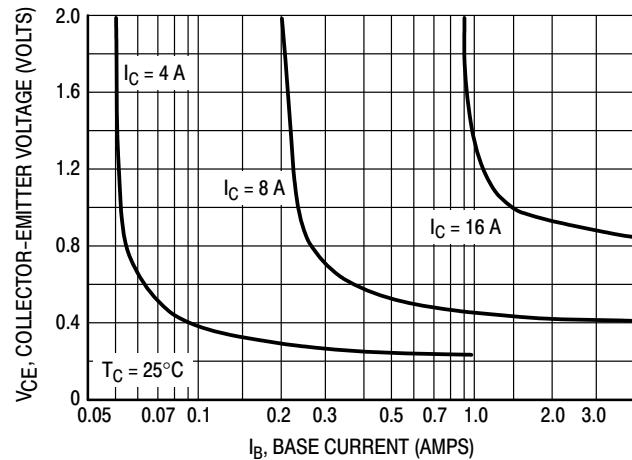


Figure 3. Collector Saturation Region

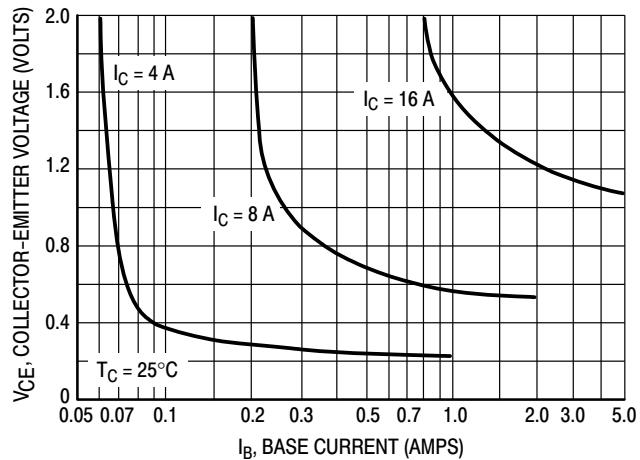


Figure 4. Collector Saturation Region

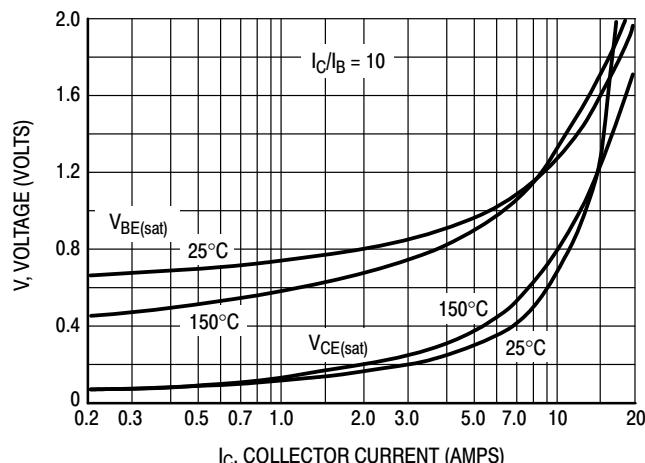


Figure 5. "On" Voltage

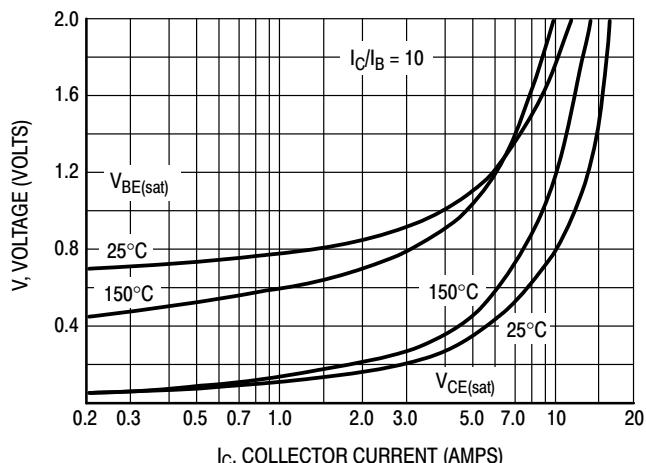


Figure 6. "On" Voltage

## TYPICAL CHARACTERISTICS

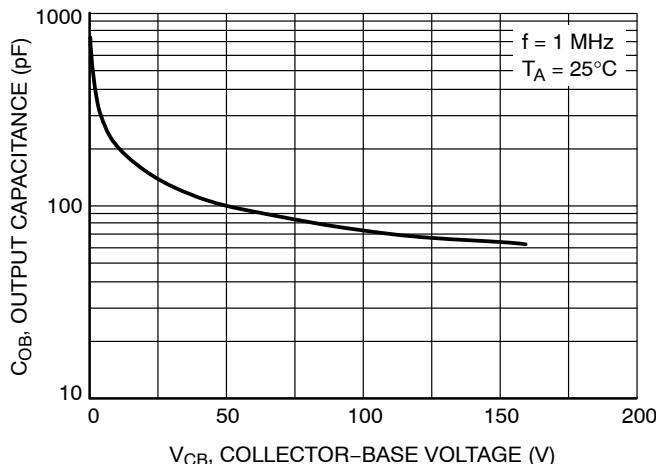


Figure 7. Output Capacitance

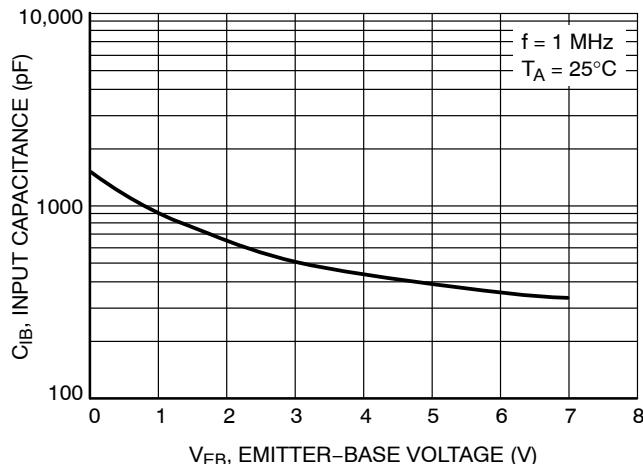


Figure 8. Input Capacitance

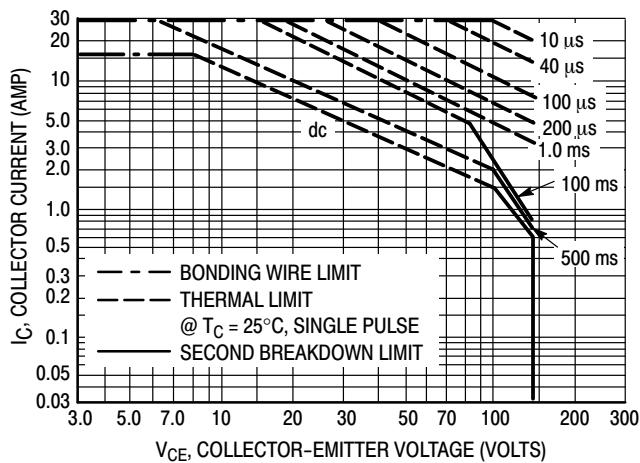


Figure 9. Forward Bias Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C$  –  $V_{CE}$  limits of the transistor that must be observed for reliable operation: i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 9 is based on  $T_{J(pk)} = 200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} < 200^\circ\text{C}$ . At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

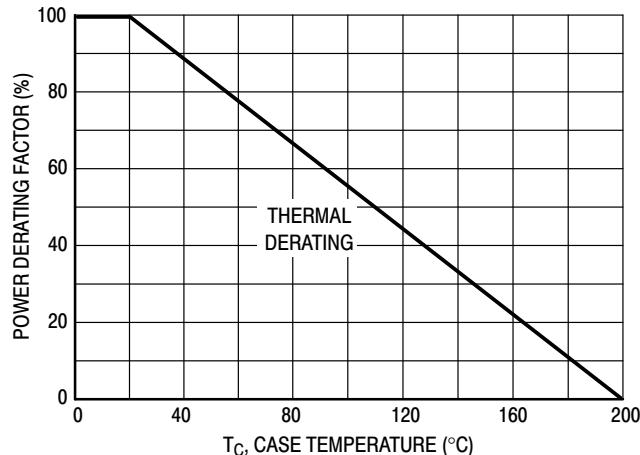
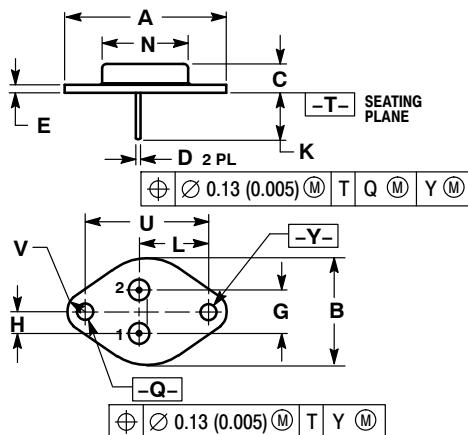


Figure 10. Power Derating

## PACKAGE DIMENSIONS

TO-204 (TO-3)  
CASE 1-07  
ISSUE Z

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.550	REF	39.37	REF
B	---	1.050	---	26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
E	0.055	0.070	1.40	1.77
G	0.430	BSC	10.92	BSC
H	0.215	BSC	5.46	BSC
K	0.440	0.480	11.18	12.19
L	0.665	BSC	16.89	BSC
N	---	0.830	---	21.08
Q	0.151	0.165	3.84	4.19
U	1.187	BSC	30.15	BSC
V	0.131	0.188	3.33	4.77

STYLE 1:  
PIN 1. BASE  
2. Emitter  
CASE: COLLECTOR

PowerBase is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

## LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada

Europe, Middle East and Africa Technical Support:  
Phone: 421 33 790 2910  
Japan Customer Focus Center  
Phone: 81-3-5817-1050

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative