

MOSFET – Power, P-Channel

-60 V, 6.5 mΩ, -100 A

ATP304

Features

- ON-Resistance $R_{DS(on)1} = 5.0 \text{ m}\Omega$ (typ)
- Input Capacitance $C_{iss} = 13000 \text{ pF}$ (typ)
- 4.5 V Drive
- This Device is Pb-Free, Halogen Free and RoHS Compliant

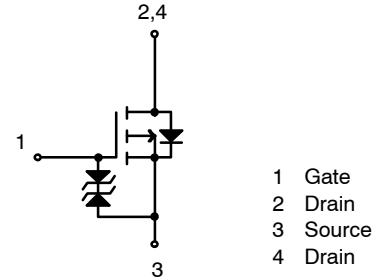
MAXIMUM RATINGS (Ta = 25°C) (Note 1)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	-60	V
Gate-to-Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	I_D	-100	A
Drain Current (Pulse) PW ≤ 10 μs, duty cycle ≤ 1%	I_{DP}	-400	A
Allowable Power Dissipation Tc = 25°C	P_D	90	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	-55 to +150	°C
Avalanche Energy (Single Pulse) (Note 1)	E_{AS}	656	mJ
Avalanche Current (Note 2)	I_{AV}	-75	A

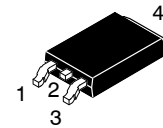
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. $V_{DD} = -36 \text{ V}$, $L = 100 \text{ }\mu\text{H}$, $I_{AV} = -75 \text{ A}$ (Figure 1)
2. $L \leq 100 \text{ }\mu\text{H}$, Single pulse

V_{DSS}	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
-60 V	6.5 mΩ @ -10 V	-100 A
	8.9 mΩ @ -4.5 V	

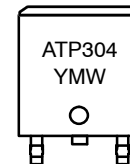


ELECTRICAL CONNECTION P-CHANNEL



DPAK (Single Gauge) / ATPAK
CASE 369AM

MARKING DIAGRAM



ATP304 = Specific Device Code
Y = Year of Production
M = Assembly Operation Month
W = Work Week in the Month

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

ATP304

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			Min	Typ	Max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -1 \text{ mA}, V_{GS} = 0 \text{ V}$	-60	-	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	-10	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = +16 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	+10	μA
Cutoff Voltage	$V_{GS(off)}$	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-1.2	-	-2.6	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -50 \text{ A}$	-	100	-	S
Static Drain to Source On-State Resistance	$R_{DS(on)1}$	$I_D = -50 \text{ A}, V_{GS} = -10 \text{ V}$	-	5.0	6.5	$\text{m}\Omega$
	$R_{DS(on)2}$	$I_D = -50 \text{ A}, V_{GS} = -4.5 \text{ V}$	-	6.4	8.9	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = -20 \text{ V}, f = 1 \text{ MHz}$	-	13000	-	pF
Output Capacitance	C_{oss}		-	1080	-	pF
Reverse Transfer Capacitance	C_{rss}		-	760	-	pF
Turn-ON Delay Time	$t_d(on)$		(Figure 2)	-	80	-
Rise Time	t_r	-		650	-	ns
Turn-OFF Delay Time	$t_d(off)$	-		780	-	ns
Fall Time	t_f	-		460	-	ns
Total Gate Charge	Q_g	$V_{DS} = -36 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -100 \text{ A}$	-	250	-	nC
Gate to Source Charge	Q_{gs}		-	55	-	nC
Gate to Drain "Miller" Charge	Q_{gd}		-	50	-	nC
Diode Forward Voltage	V_{SD}	$I_S = -100 \text{ A}, V_{GS} = 0 \text{ V}$	-	-1.0	-1.5	V
Reverse Recovery Time	t_{rr}	(Figure 3)	-	90	-	ns
Reverse Recovery Charge	Q_{rr}	$I_S = -100 \text{ A}, V_{GS} = 0 \text{ V}, di/dt = -100 \text{ A} / \mu\text{s}$	-	245	-	nC

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.

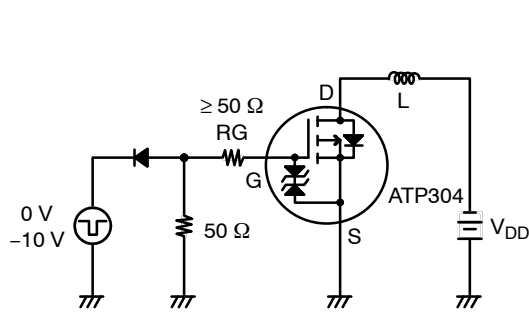


Figure 1. Unclamped Inductive Switching Test Circuit

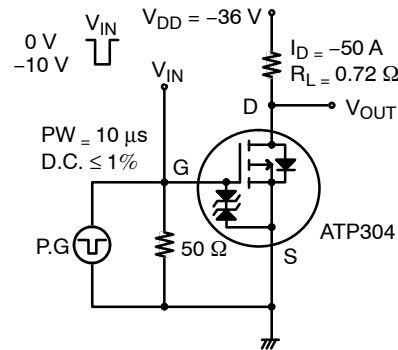


Figure 2. Switching Time Test Circuit

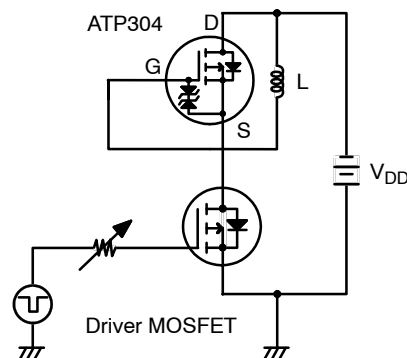


Figure 3. Reverse Recovery Time Test Circuit

TYPICAL CHARACTERISTICS

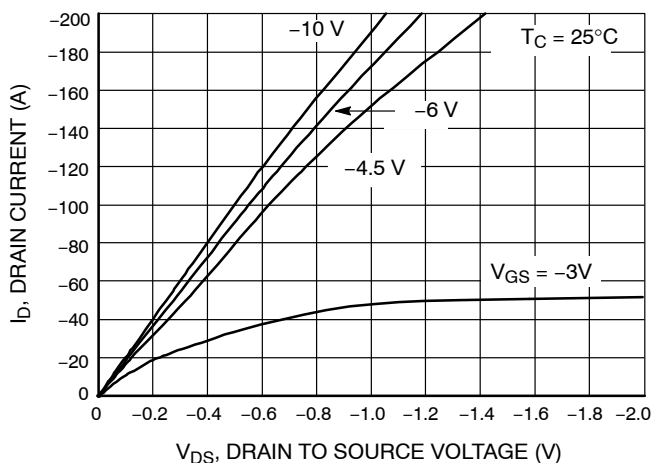


Figure 4. $I_D - V_{DS}$

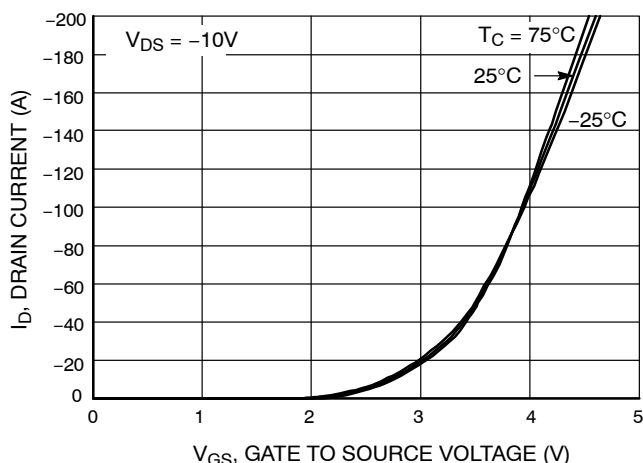


Figure 5. $I_D - V_{GS}$ (off)

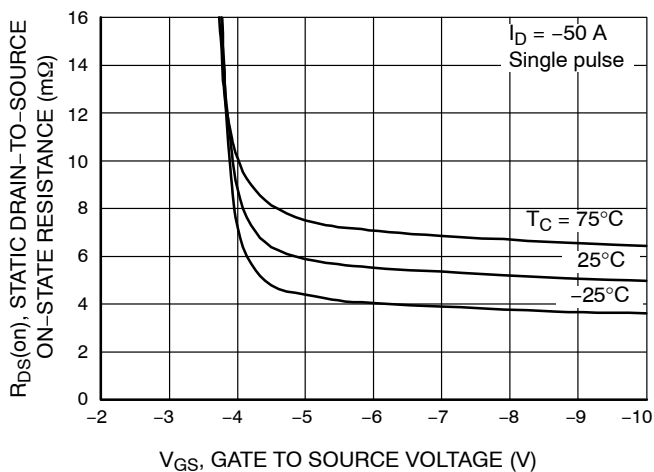


Figure 6. $R_{DS(on)} - V_{GS}$

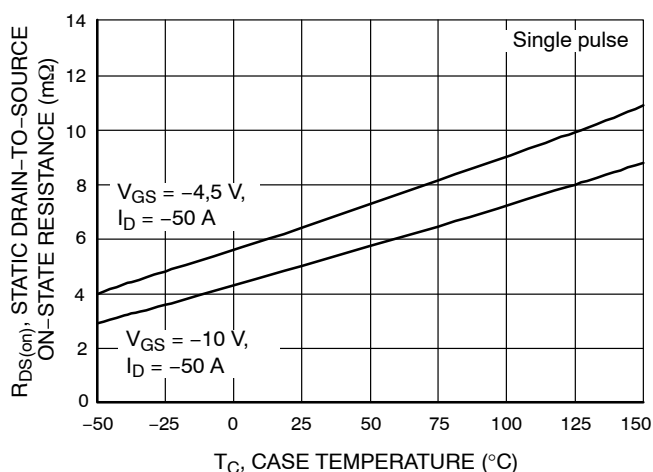


Figure 7. $R_{DS(on)} - T_c$

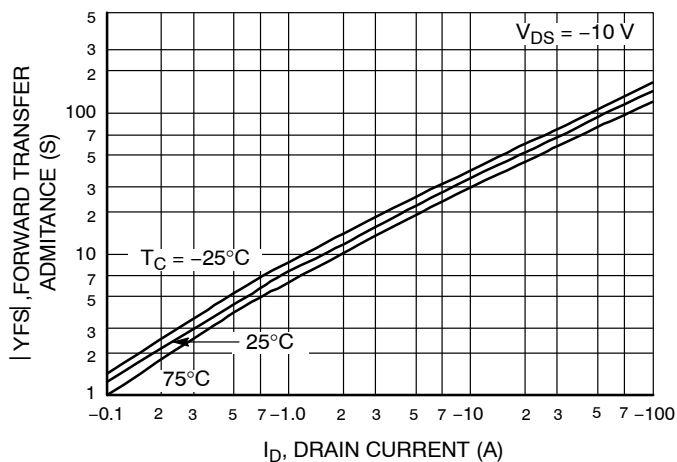


Figure 8. $|y_{fs}| - I_D$

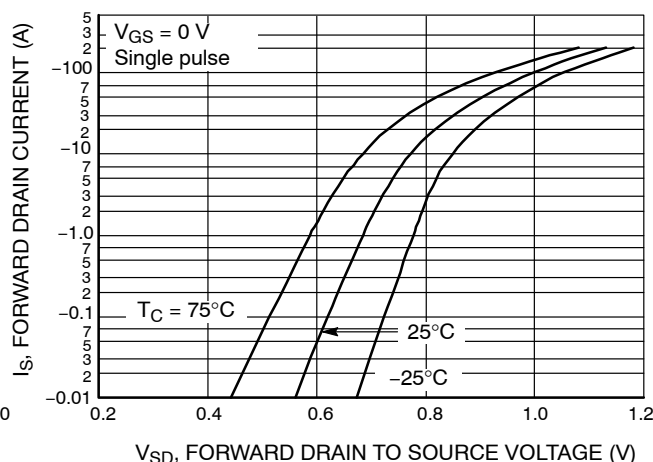


Figure 9. $I_S - V_{SD}$

TYPICAL CHARACTERISTICS (CONTINUED)

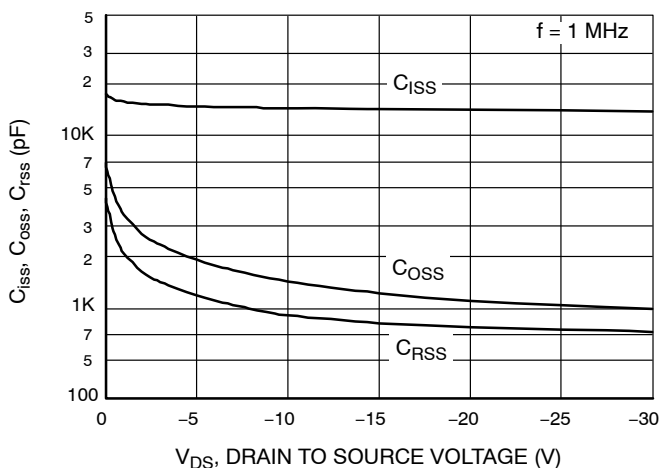


Figure 10. C_{iss} , C_{oss} , $C_{rss} - V_{DS}$

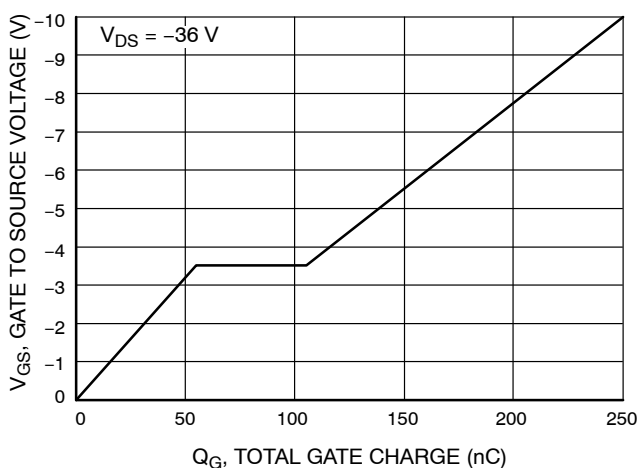


Figure 11. $Q_g - V_{GS}$

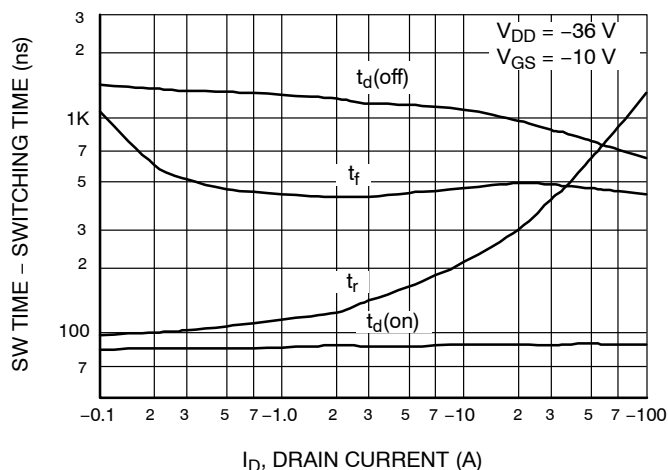


Figure 12. SW Time - I_D

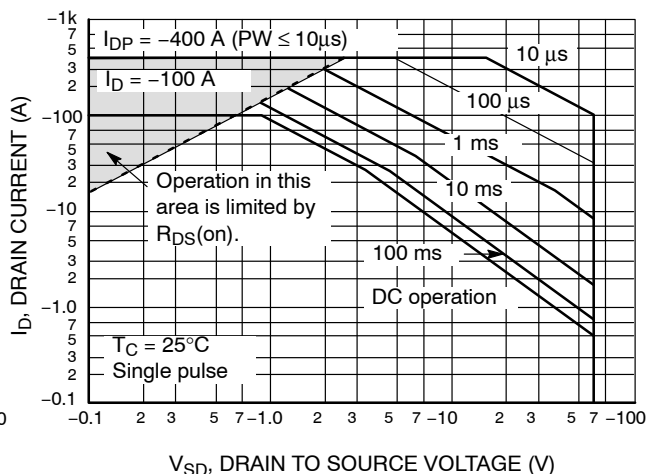


Figure 13. SOA

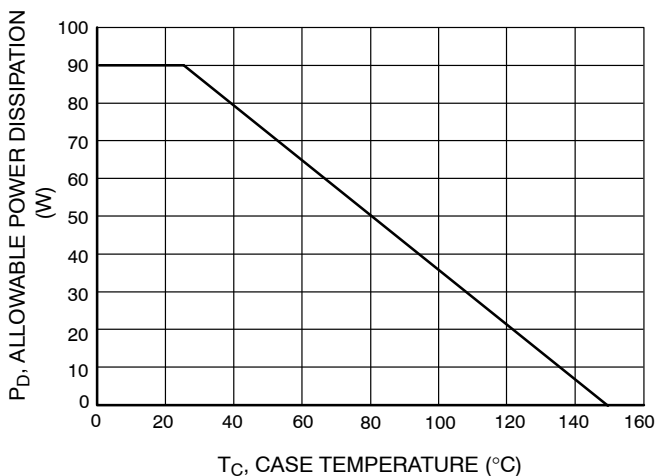


Figure 14. $P_D - T_C$

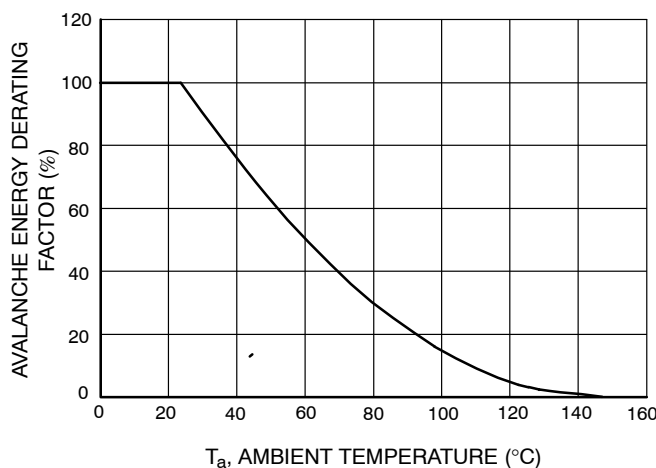


Figure 15. $E_{AS} - T_a$

ATP304

TYPICAL CHARACTERISTICS (CONTINUED)

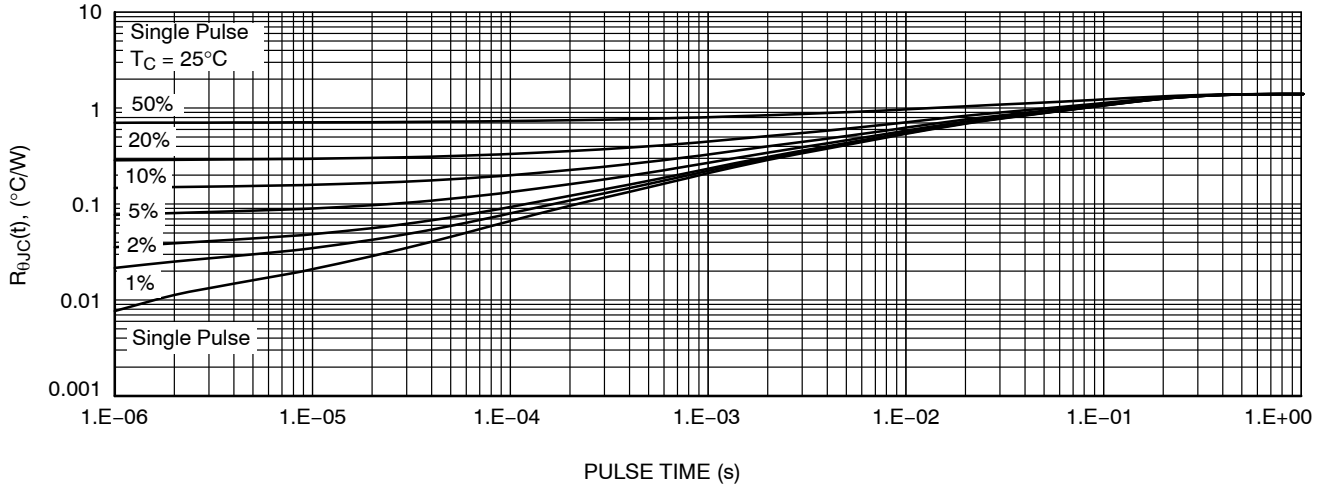


Figure 16. Thermal Response

DEVICE ORDERING INFORMATION

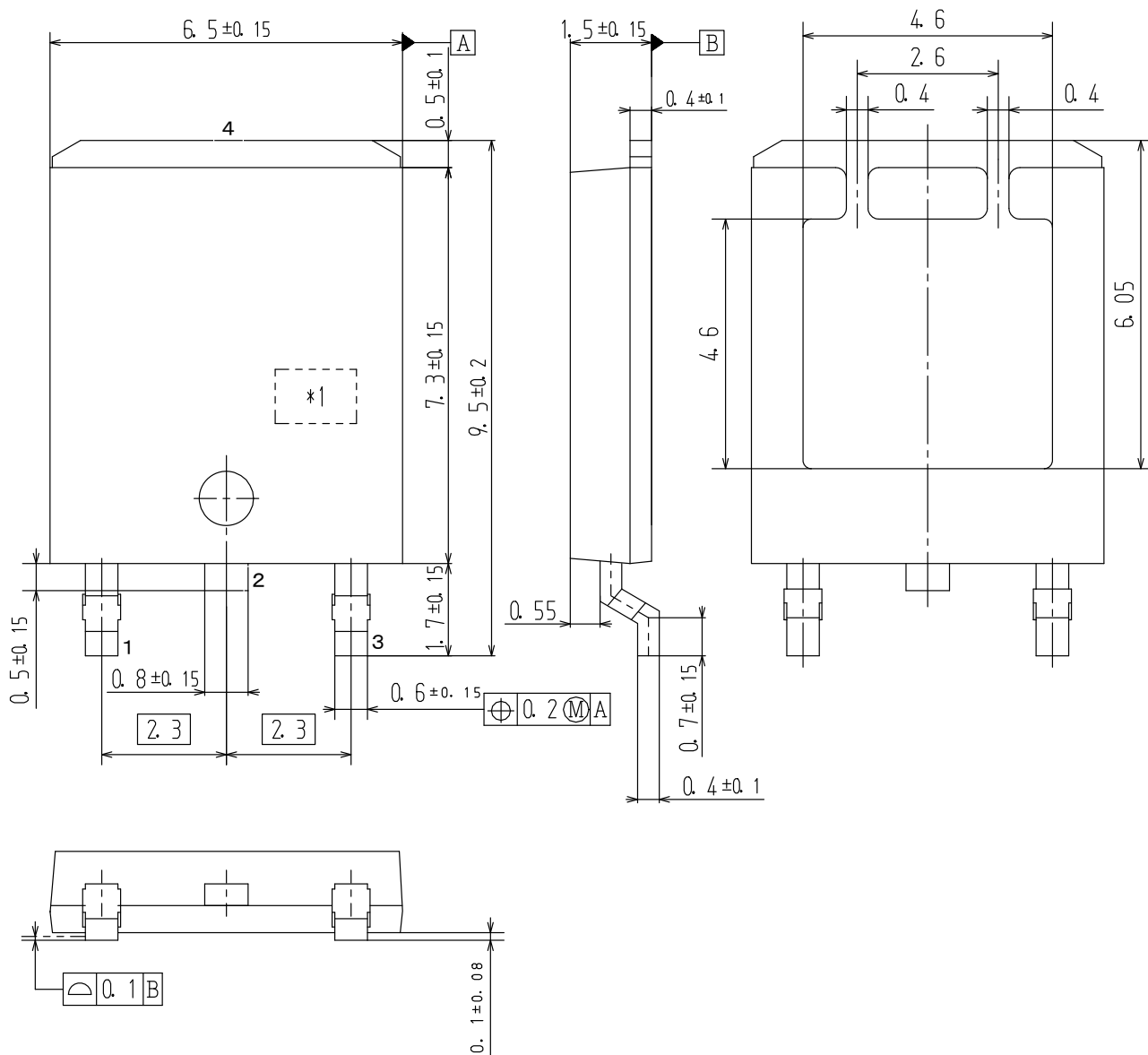
Device	Marking	Package	Shipping [†]
ATP304-TL-H	ATP304	DPAK (Single Gauge) / ATPAK (Pb-Free / Halogen Free)	3000/ Tape & Reel

[†]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](#).

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS


DPAK (Single Gauge) / ATPAK
CASE 369AM
ISSUE O

DATE 29 FEB 2012



Pin2 is idle pin with electrical
designation only carried

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DESCRIPTION: DPAK (SINGLE GAUGE) / ATPAK	PAGE 1 OF 1

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