



**P-CHANNEL MOSFET**  
**Qualified per MIL-PRF-19500/562**

Qualified Levels:  
 JAN, JANTX, and  
 JANTXV

**DESCRIPTION**

This 2N6804 switching transistor is military qualified up to the JANTXV level for high-reliability applications. Microsemi also offers numerous other transistor products to meet higher and lower power ratings with various switching speed requirements in both through-hole and surface-mount packages.

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**FEATURES**

- JEDEC registered 2N6804 number series.
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/562. (See [part nomenclature](#) for all available options.)
- RoHS compliant version available (commercial grade only).



**TO-204AA (TO-3)  
 Package**

**APPLICATIONS / BENEFITS**

- Low-profile metal can design.
- Military and other high-reliability applications.

**MAXIMUM RATINGS @ T<sub>A</sub> = +25 °C unless otherwise stated**

Parameters / Test Conditions	Symbol	Value	Unit
Operating & Storage Junction Temperature Range	T <sub>J</sub> & T <sub>stg</sub>	-55 to +150	°C
Thermal Resistance Junction-to-Case	R <sub>θJC</sub>	1.67	°C/W
Total Power Dissipation	P <sub>T</sub>	4 75	W
		@ T <sub>A</sub> = +25 °C	
		@ T <sub>C</sub> = +25 °C <sup>(1)</sup>	
Drain-Source Voltage, dc	V <sub>DS</sub>	-100	V
Gate-Source Voltage, dc	V <sub>GS</sub>	± 20	V
Drain Current, dc @ T <sub>C</sub> = +25 °C <sup>(2)</sup>	I <sub>D1</sub>	-11.0	A
Drain Current, dc @ T <sub>C</sub> = +100 °C <sup>(2)</sup>	I <sub>D2</sub>	-7.0	A
Off-State Current (Peak Total Value) <sup>(3)</sup>	I <sub>DM</sub>	-50	Ω
Source Current	I <sub>S</sub>	-11	A

- NOTES:**
1. Derated linearly by 0.6 W/°C for T<sub>C</sub> > +25 °C.
  2. The following formula derives the maximum theoretical I<sub>D</sub> limit. I<sub>D</sub> is limited by package and internal wires and may be limited by pin diameter:

$$I_D = \sqrt{\frac{T_J(\text{max}) - T_C}{R_{\theta JC} \times R_{bs(\text{on})} @ T_J(\text{max})}}$$

3. I<sub>DM</sub> = 4 x I<sub>D1</sub> as calculated in note 2.

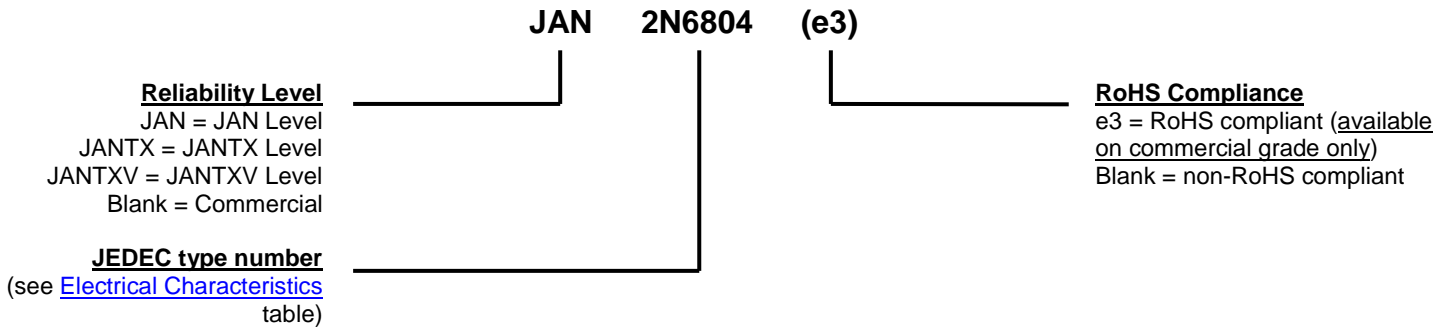
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**MECHANICAL and PACKAGING**

- CASE: TO-3 metal can.
- TERMINALS: Solder dipped (Sn63/Pb37) over nickel plated alloy 52. RoHS compliant matte-tin plating is also available.
- MARKING: Manufacturer's ID, part number, date code, ESD symbol.
- WEIGHT: Approximately 12.7 grams.
- See [Package Dimensions](#) on last page.

**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

Symbol	Definition
$di/dt$	Rate of change of diode current while in reverse-recovery mode, recorded as maximum value.
$I_F$	Forward current
$R_G$	Gate drive impedance
$V_{DD}$	Drain supply voltage
$V_{DS}$	Drain source voltage, dc
$V_{GS}$	Gate source voltage, dc

**ELECTRICAL CHARACTERISTICS @  $T_A = +25\text{ }^\circ\text{C}$ , unless otherwise noted**

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Drain-Source Breakdown Voltage $V_{GS} = 0\text{ V}$ , $I_D = -1.0\text{ mA}$	$V_{(BR)DSS}$	-100		V
Gate-Source Voltage (Threshold) $V_{DS} \geq V_{GS}$ , $I_D = -0.25\text{ mA}$ $V_{DS} \geq V_{GS}$ , $I_D = -0.25\text{ mA}$ , $T_J = +125\text{ }^\circ\text{C}$ $V_{DS} \geq V_{GS}$ , $I_D = -0.25\text{ mA}$ , $T_J = -55\text{ }^\circ\text{C}$	$V_{GS(th)1}$ $V_{GS(th)2}$ $V_{GS(th)3}$	-2.0 -1.0	-4.0 -5.0	V
Gate Current $V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$ $V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$ , $T_J = +125\text{ }^\circ\text{C}$	$I_{GSS1}$ $I_{GSS2}$		$\pm 100$ $\pm 200$	nA
Drain Current $V_{GS} = 0\text{ V}$ , $V_{DS} = -80\text{ V}$	$I_{DSS1}$		-25	$\mu\text{A}$
Drain Current $V_{GS} = 0\text{ V}$ , $V_{DS} = -80\text{ V}$ , $T_J = +125\text{ }^\circ\text{C}$	$I_{DSS2}$		0.25	mA
Static Drain-Source On-State Resistance $V_{GS} = -10\text{ V}$ , $I_D = -7\text{ A}$ pulsed	$r_{DS(on)1}$		0.30	$\Omega$
Static Drain-Source On-State Resistance $V_{GS} = -10\text{ V}$ , $I_D = -11\text{ A}$ pulsed	$r_{DS(on)2}$		0.36	$\Omega$
Static Drain-Source On-State Resistance $T_J = +125\text{ }^\circ\text{C}$ $V_{GS} = -10\text{ V}$ , $I_D = -7\text{ A}$ pulsed	$r_{DS(on)3}$		0.55	$\Omega$
Diode Forward Voltage $V_{GS} = 0\text{ V}$ , $I_S = -11.0\text{ A}$ pulsed	$V_{SD}$		-4.7	V

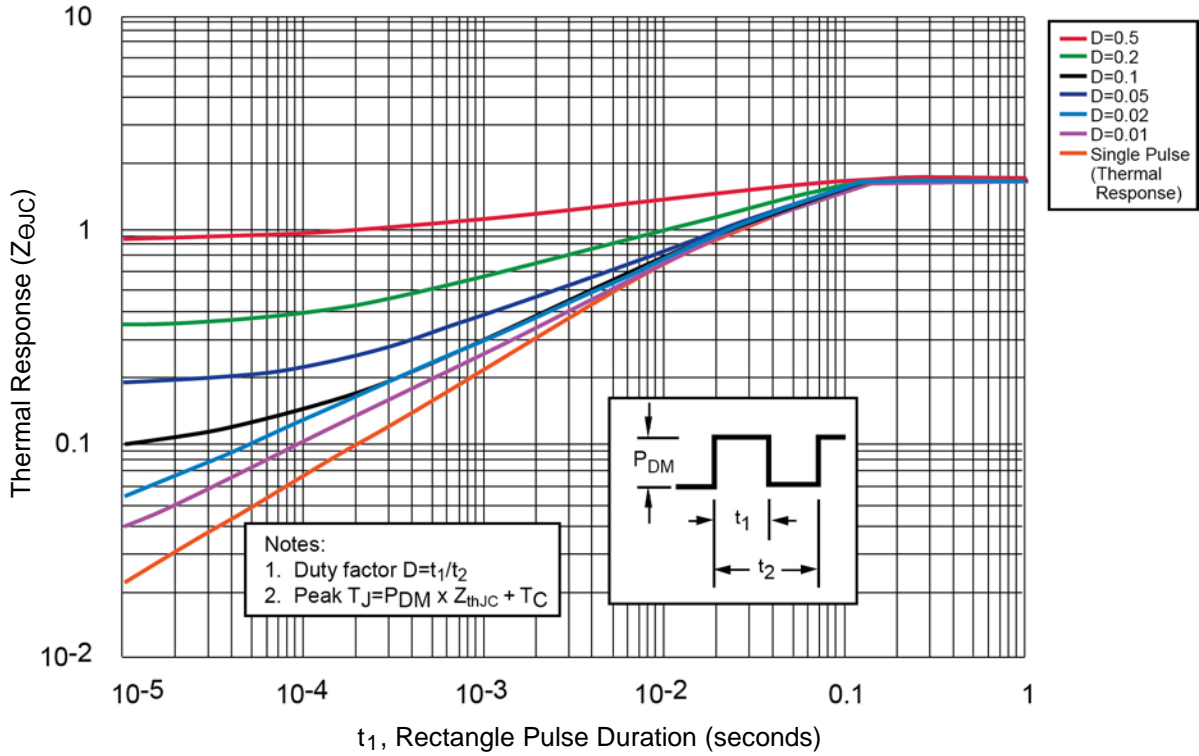
**DYNAMIC CHARACTERISTICS**

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Gate Charge:				
On-State Gate Charge $V_{GS} = -10\text{ V}$ , $I_D = -11\text{ A}$ , $V_{DS} = -50\text{ V}$	$Q_{g(on)}$		29.0	nC
Gate to Source Charge $V_{GS} = -10\text{ V}$ , $I_D = -11\text{ A}$ , $V_{DS} = -50\text{ V}$	$Q_{gs}$		7.1	nC
Gate to Drain Charge $V_{GS} = -10\text{ V}$ , $I_D = -11\text{ A}$ , $V_{DS} = -50\text{ V}$	$Q_{gd}$		21.0	nC

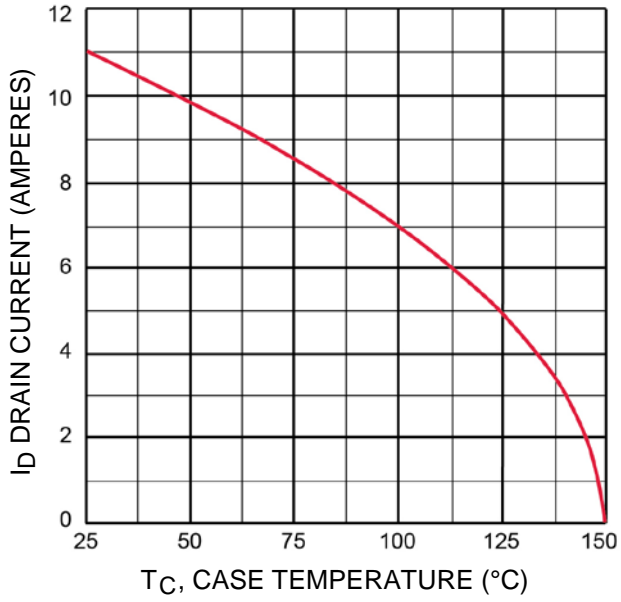
**ELECTRICAL CHARACTERISTICS @  $T_A = +25\text{ }^\circ\text{C}$ , unless otherwise noted (continued)**
**SWITCHING CHARACTERISTICS**

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-on delay time $I_D = -11\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_G = 7.5\ \Omega$ , $V_{DD} = -35\text{ V}$	$t_{d(on)}$		60	ns
Rinse time $I_D = -11\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_G = 7.5\ \Omega$ , $V_{DD} = -35\text{ V}$	$t_r$		140	ns
Turn-off delay time $I_D = -11\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_G = 7.5\ \Omega$ , $V_{DD} = -35\text{ V}$	$t_{d(off)}$		140	ns
Fall time $I_D = -11\text{ A}$ , $V_{GS} = -10\text{ V}$ , $R_G = 7.5\ \Omega$ , $V_{DD} = -35\text{ V}$	$t_f$		140	ns
Diode Reverse Recovery Time $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq -50\text{ V}$ , $I_F = -11\text{ A}$	$t_{rr}$		250	ns

GRAPHS

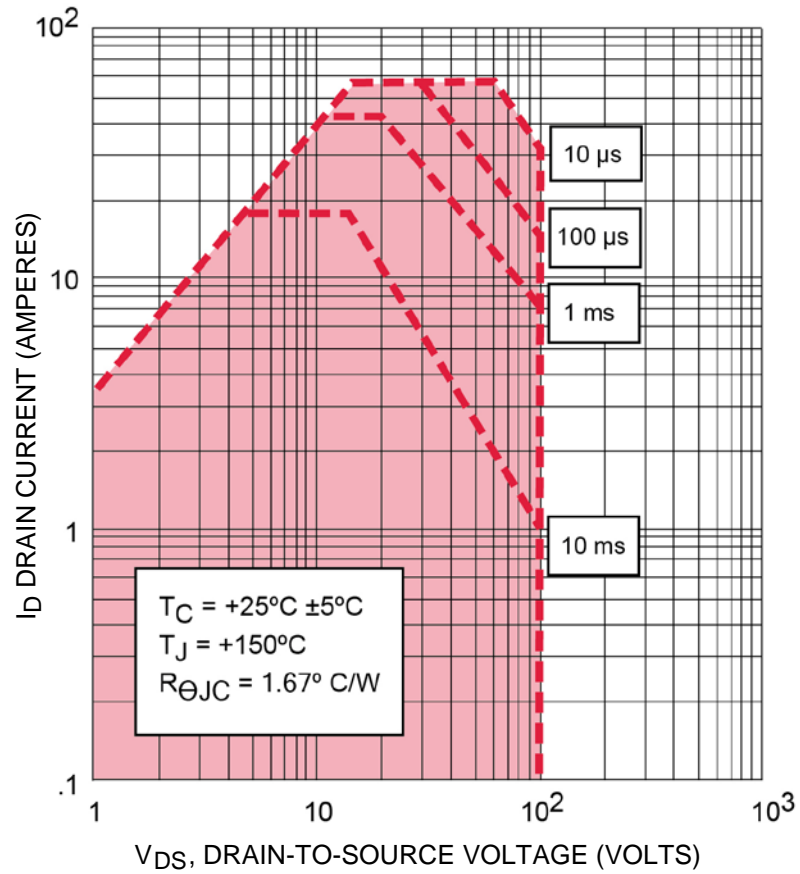


**FIGURE 1**  
Transient Thermal impedance



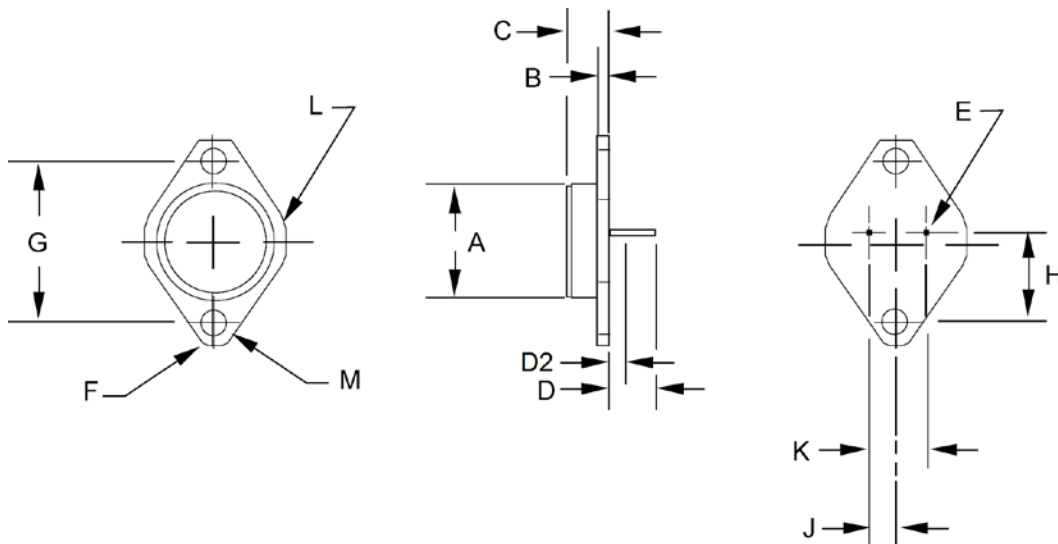
**FIGURE 2**  
Maximum Drain Current vs Case Temperature

GRAPHS (continued)



**FIGURE 3**  
Safe Operating Area

PACKAGE DIMENSIONS

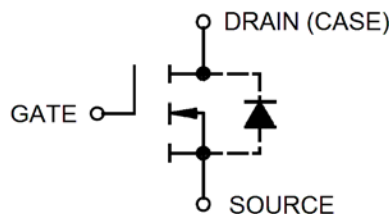


**NOTE:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. These dimensions should be measured at points .050 inch (1.27 mm) and .055 inch (1.40 mm) below seating plane. When gauge is not used measurement will be made at the seating plane.
4. The seating plane of the header shall be flat within .001 inch (0.03 mm) concave to .004 inch (0.10 mm) convex inside a .930 inch (23.62 mm) diameter circle on the center of the header and flat within .001 inch (0.03 mm) concave to .006 inch (0.15 mm) convex overall.
5. Mounting holes shall be deburred on the seating plane side.
6. Drain is electrically connected to the case.
7. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.

DIM	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	-	.875	-	22.23	
B	.060	.135	1.52	3.43	
C	.250	.360	6.35	9.15	3
D	.312	.500	7.92	12.70	
D2	-	.050	-	1.27	
E	.038	.043	0.97	1.10	DIA.
F	.131	.188	3.33	4.78	Radius
G	1.177	1.197	29.90	30.40	
H	.655	.675	16.64	17.15	
J	.205	.225	5.21	5.72	3
K	.420	.440	10.67	11.18	3
L	.495	.525	12.57	13.34	Radius
M	.151	.161	3.84	4.09	DIA.

SCHEMATIC



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