

POWER MOSFET TRANSISTORS

100 Volt, 0.18 Ohm
N-Channel

2N6755
J, JTX, JTXV 2N6756

FEATURES

- Fast Switching
- Low Drive Current
- Ease of Paralleling
- No Second Breakdown
- Excellent Temperature Stability
- Qualified to MIL-S-19500/542A

DESCRIPTION

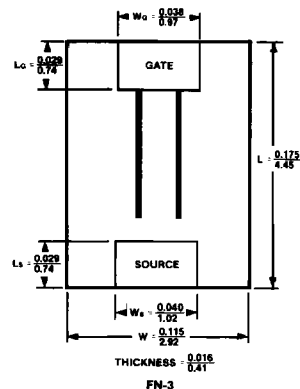
The Unitrode power MOSFET design utilizes the most advanced technology available. This efficient design achieves a very low $R_{DS(on)}$ and a high transconductance.

The Unitrode power MOSFET features all of the advantages of MOS technology such as voltage control, freedom from second breakdown, very fast switching speeds, and thermal stability.

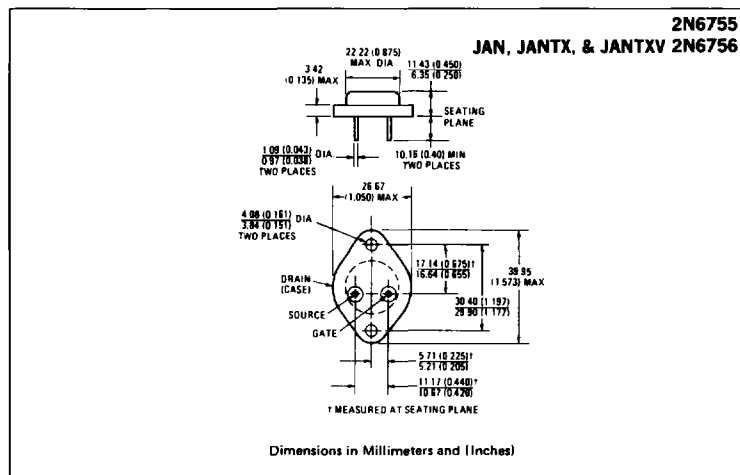
These power MOSFETs are ideally suited for many high-speed, high-power switching applications such as switching power supplies, motor controls, and wide-band and audio amplifiers.

PRODUCT SUMMARY

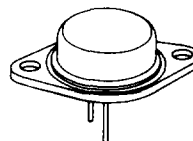
Part Number	V_{DS}	$R_{DS(on)}$	I_D
2N6755	60V	0.25Ω	12A
2N6756	100V	0.18Ω	14A



MECHANICAL SPECIFICATIONS



TO-204AA (TO-3)



ABSOLUTE MAXIMUM RATINGS

Parameter	2N6755	2N6756	Units
V_{DS} Drain - Source Voltage	60*	100*	V
V_{DGR} Drain - Gate Voltage ($R_{GS} = 1 \text{ M}\Omega$)	60*	100*	V
$I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current	12*	14*	A
$I_D @ T_C = 100^\circ\text{C}$ Continuous Drain Current	8.0*	9.0*	A
I_{DM} Pulsed Drain Current	25	30	A
V_{GS} Gate - Source Voltage	$\pm 20^*$		V
$P_D @ T_C = 25^\circ\text{C}$ Max. Power Dissipation	75* (See Fig. 11)		W
$P_D @ T_C = 100^\circ\text{C}$ Max. Power Dissipation	30* (See Fig. 11)		W
Linear Derating Factor	0.6* (See Fig. 11)		W/K
I_{LM} Inductive Current, Clamped	(See Fig. 1 and 2) $L = 100 \mu\text{H}$ 25 30		A
T_J Operating and T_{stg} Storage Temperature Range	-55° to 150°		$^\circ\text{C}$
Lead Temperature	300* (0.063 in. (1.6mm) from case for 10s)		$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS @ $T_C = 25^\circ\text{C}$ (Unless otherwise specified)

Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS} Drain - Source Breakdown Voltage	2N6755	60	—	—	V	$V_{GS} = 0$
	2N6756	100	—	—	V	$I_D = 1.0 \text{ mA}$
$V_{GS(th)}$ Gate Threshold Voltage	ALL	2.0*	—	4.0*	V	$V_{DS} = V_{GS}$, $I_D = .25 \text{ mA}$
I_{GSSF} Gate - Body Leakage Forward	ALL	—	—	100*	nA	$V_{GS} = 20\text{V}$
I_{GSSR} Gate - Body Leakage Reverse	ALL	—	—	100*	nA	$V_{GS} = -20\text{V}$
I_{DSS} Zero Gate Voltage Drain Current	ALL	—	0.1	25*	mA	$V_{DS} = \text{Max. Rating}$, $V_{GS} = 0$
		—	0.2	1.0*	mA	$V_{DS} = \text{Max. Rating}$, $V_{GS} = 0$, $T_C = 125^\circ\text{C}$
$V_{DS(on)}$ Static Drain-Source On-State Voltage ①	2N6755	—	—	3.0*	V	$V_{GS} = 10\text{V}$, $I_D = 12\text{A}$
	2N6756	—	—	2.52*	V	$V_{GS} = 10\text{V}$, $I_D = 14\text{A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ①	2N6755	—	0.20	0.25*	Ω	$V_{GS} = 10\text{V}$, $I_D = 8\text{A}$
	2N6756	—	0.14	0.18*	Ω	$V_{GS} = 10\text{V}$, $I_D = 9\text{A}$
$R_{DS(on)}$ Static Drain-Source On-State Resistance ①	2N6755	—	—	0.45*	Ω	$V_{GS} = 10\text{V}$, $I_D = 8\text{A}$, $T_C = 125^\circ\text{C}$
	2N6756	—	—	0.33*	Ω	$V_{GS} = 10\text{V}$, $I_D = 9\text{A}$, $T_C = 125^\circ\text{C}$
g_{fs} Forward Transconductance ①	ALL	4.0*	5.5	12.0*	S (S)	$V_{DS} = 15\text{V}$, $I_D = 9\text{A}$
C_{iss} Input Capacitance	ALL	350*	600	800*	pF	$V_{GS} = 0$, $V_{DS} = 25\text{V}$, $f = 1.0 \text{ MHz}$
C_{oss} Output Capacitance	ALL	150*	300	500*	pF	See Fig. 10
C_{rss} Reverse Transfer Capacitance	ALL	50*	100	150*	pF	
$t_{d(on)}$ Turn-On Delay Time	ALL	—	—	30*	ns	$V_{DD} \approx 36\text{V}$, $I_D = 9\text{A}$, $Z_\theta = 15\Omega$
t_r Rise Time	ALL	—	—	75*	ns	(See Figs. 13 and 14)
$t_{d(off)}$ Turn-Off Delay Time	ALL	—	—	40*	ns	(MOSFET switching times are essentially independent of operating temperature.)
t_f Fall Time	ALL	—	—	45*	ns	

THERMAL RESISTANCE

R_{thJC} Junction-to-Case	ALL	—	—	1.67*	K/W	
R_{thCS} Case-to-Sink	ALL	—	0.1	—	K/W	Mounting surface flat, smooth, and greased.
R_{thJA} Junction-to-Ambient	ALL	—	—	30	K/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S Continuous Source Current (Body Diode)	2N6755	—	—	12*	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier.
	2N6756	—	—	14*	A	
I_{SM} Pulsed Source Current (Body Diode)	2N6755	—	—	25	A	
	2N6756	—	—	30	A	
V_{SD} Diode Forward Voltage ①	2N6755	0.85*	—	1.7*	V	$T_C = 25^\circ\text{C}$, $I_S = 12\text{A}$, $V_{GS} = 0$
	2N6756	0.90*	—	1.8*	V	$T_C = 25^\circ\text{C}$, $I_S = 14\text{A}$, $V_{GS} = 0$
t_{rr} Reverse Recovery Time	ALL	—	—	300	ns	$T_J = 150^\circ\text{C}$, $I_F = I_{SM}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$
Q_{RR} Reverse Recovered Charge	ALL	—	4.0	—	μC	$T_J = 150^\circ\text{C}$, $I_F = I_{SM}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$

* JEDEC registered values. ① Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$

Fig. 1 — Clamped Inductive Test Circuit

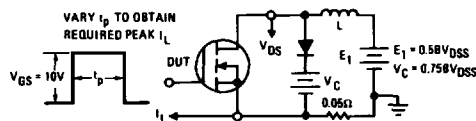


Fig. 2 — Clamped Inductive Waveforms

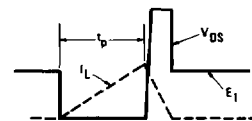


Fig. 3 – Typical Output Characteristics

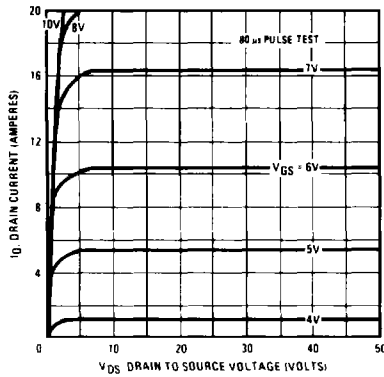


Fig. 5 – Typical Saturation Characteristics (2N6755)

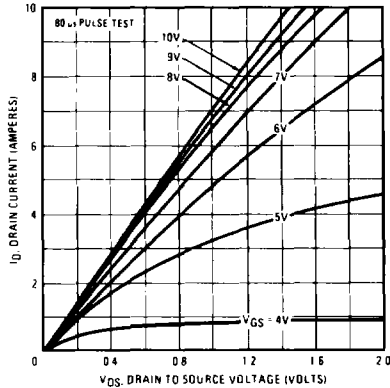


Fig. 7 – Typical Transconductance Vs. Drain Current

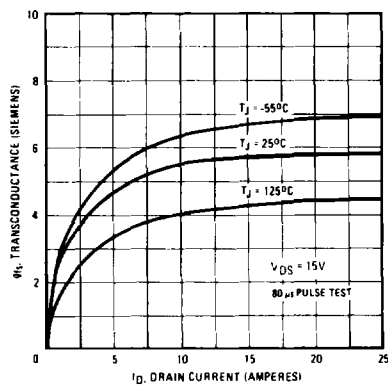


Fig. 4 – Typical Transfer Characteristics

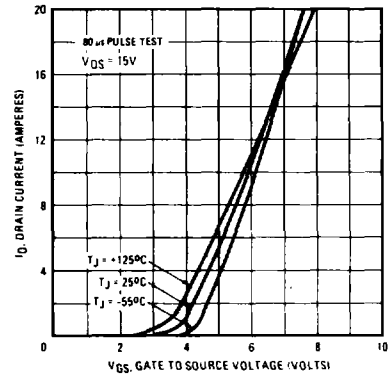


Fig. 6 – Typical Saturation Characteristics (2N6756)

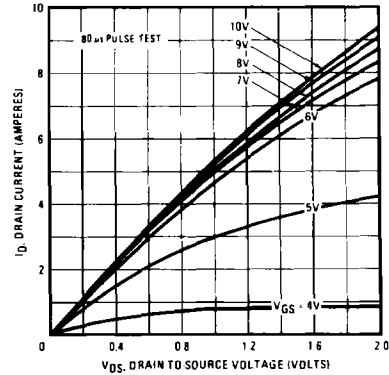


Fig. 8 – Maximum Safe Operating Area

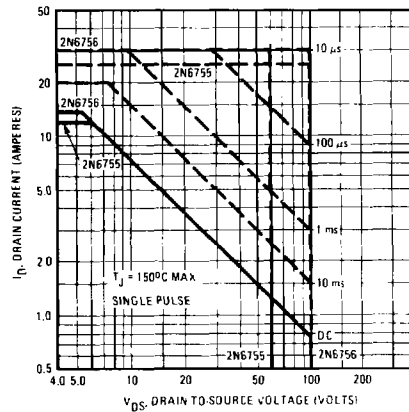


Fig. 9 — Normalized Typical On-Resistance Vs. Temperature

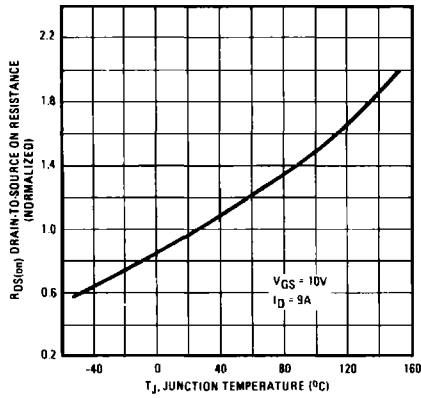


Fig. 10 — Typical Capacitance Vs. Drain-to-Source Voltage

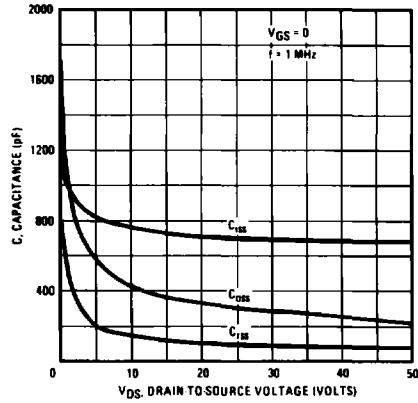


Fig. 11 — Power Vs. Temperature Derating Curve

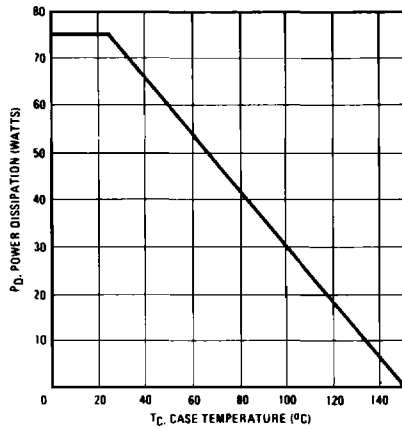


Fig. 12 — Typical Body-Drain Diode Forward Voltage

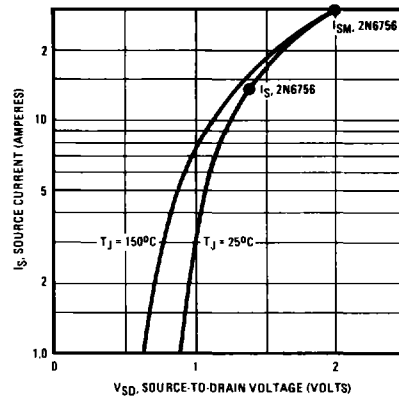


Fig. 13 — Switching Time Test Circuit

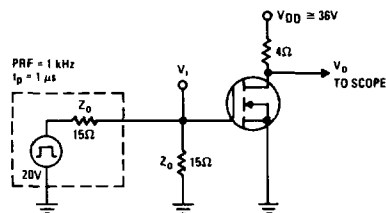


Fig. 14 — Switching Time Waveforms

