2N6660

N-Channel, Enhancement-Mode, Vertical DMOS FET

Features

- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low C_{ISS} and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain

Applications

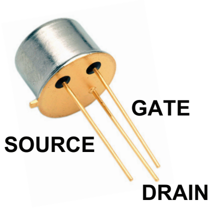
- Motor controls
- Converters
- Amplifiers
- Switches
- Power supply circuits
- Drivers: relays, hammers, solenoids, lamps, memories, displays, bipolar transistors, etc.

Description

2N6660 is an enhancement-mode (normally-off) transistor that utilizes a vertical DMOS structure and a well-proven silicon-gate manufacturing process. This combination produces a device with the power-handling capabilities of bipolar transistors, and the high input impedance and positive temperature coefficient inherent in MOS devices. Characteristic of all MOS structures, this device is free from thermal runaway and thermally-induced secondary breakdown.

Vertical DMOS FETs are ideally suited to a wide range of switching and amplifying applications where very-low threshold voltage, high breakdown voltage, high-input impedance, low-input capacitance, and fast switching speeds are desired.

Package Types



TO-39
Case: Drain

See Table 2-1 for pin information

1.0 ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS†

Drain-to-source voltage	BV_{DSS}
Drain-to-gate voltage	BV_{DGS}
Gate-to-source voltage	±20V
Operating and Storage Temperature	-55 to 150 °C

† Notice: Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

Electrical Specifications: Unless otherwise specified, for all specifications T_A = +25°C

Parameter	Symbol	Min	Typ	Max	Units	Conditions
DC Parameters (**Note 1**, unless otherwise stated)						
Drain-to-source breakdown voltage	BV_{DSS}	60	-	-	V	V_{GS}= 0V, I_D= 10μA
Gate threshold voltage	$V_{GS(th)}$	0.8	-	2.0	V	V_{GS}= V_{DS}, I_D= 1.0mA
$V_{GS(th)}$ change with temperature	$\Delta V_{GS(th)}$	-	-3.8	-5.5	mV/°C	V_{GS}= V_{DS}, I_D= 1.0mA (**Note 2**)
Gate body leakage current	I_{GSS}	-	-	100	nA	V_{GS}= ±20V, V_{DS}= 0V
Zero gate voltage drain current	I_{DSS}	-	-	10	μA	V_{GS}= 0V, V_{DS}= Max rating
		-	-	500		V_{DS}= 0.8 Max Rating, V_{GS}= 0V, T_A= 125°C (**Note 2**)
On-state drain current	$I_{D(ON)}$	1.5	-	-	A	V_{GS}= 10V, V_{DS}= 10V
Static drain-to-source on-state resistance	$R_{DS(ON)}$	-	-	5.0	Ω	V_{GS}= 5.0V, I_D= 0.3A
		-	-	3.0		V_{GS}= 10V, I_D= 1.0A
AC Parameters (**Note 2**)						
Forward transconductance	G_{FS}	170	-	-	mmho	V_{DS}= 25V, I_D= 0.5A
Input capacitance	C_{ISS}	-	-	50	pF	V_{GS}= 0V, V_{DS}= 24V, f = 1.0MHz
Common source output capacitance	C_{OSS}	-	-	40		
Reverse transfer capacitance	C_{RSS}	-	-	10		
Turn-on time	$t_{(ON)}$	-	-	10	ns	V_{DD}= 25V, I_D= 1.0A, R_{GEN}= 25Ω
Turn-off time	$t_{(OFF)}$	-	-	10		
Diode Parameters						
Diode forward voltage drop	V_{SD}	-	1.2	-	V	V_{GS}= 0V, I_{SD}= 1.0A (**Note 1**)
Reverse recovery time	t_{rr}	-	350	-	ns	V_{GS}= 0V, I_{SD}= 1.0A (**Note 2**)

Note 1: All DC parameters are 100% tested at 25°C unless otherwise stated. Pulse test: 300 μs pulse, 2% duty cycle.

2: Specification is obtained by characterization and is not 100% tested.

TEMPERATURE SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Temperature Ranges						
Operating and Storage Temperature	T_A	-55	–	150	°C	

THERMAL CHARACTERISTICS

Package	I_D(1) continuous (mA)	I_D pulsed (A)	Power Dissipation @T_A = 25°C (W)	I_{DR}(1) (mA)	I_{DRM} (A)
TO-39	410	3.0	6.25	410	3.0

Note 1: I_D (continuous) is limited by max rated T_J.

Product Summary

BV_{DSX}/BV_{DGS} (V)	$R_{DS(ON)}$ (max) (Ω)	I_{DSS} (min) (A)
60	3.0	1.5

2.0 PIN DESCRIPTION

The locations of the pins are listed in Package Types and Packaging Information.

TABLE 2-1: PIN DESCRIPTION

Pin # TO-39	Function
1	SOURCE
2	GATE
3	DRAIN

3.0 FUNCTIONAL DESCRIPTION

Figure 3-1 shows the switching waveform and test circuit for 2N6660.

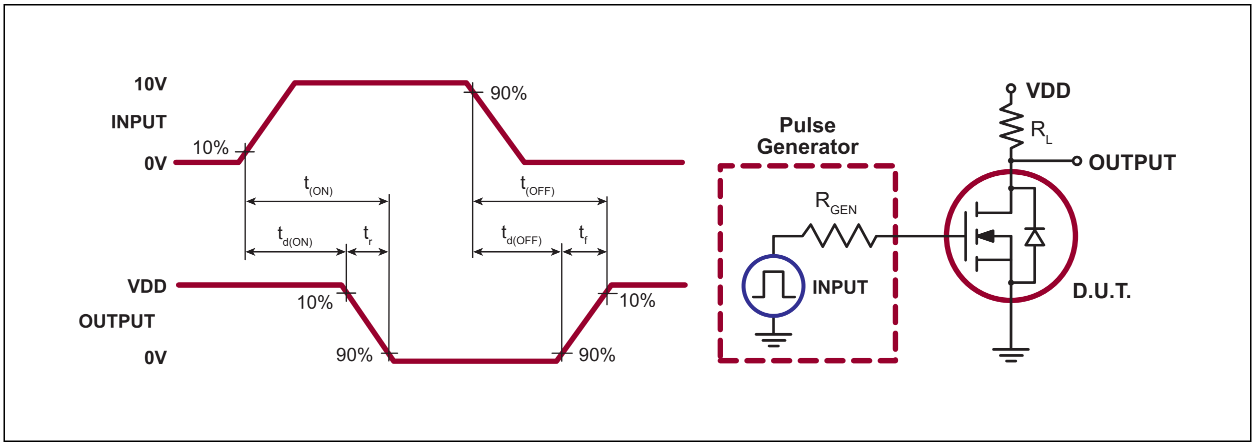
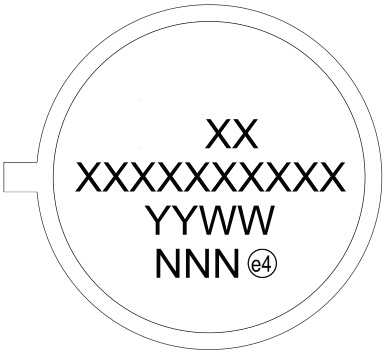


FIGURE 3-1: *Switching Waveforms and Test Circuit*

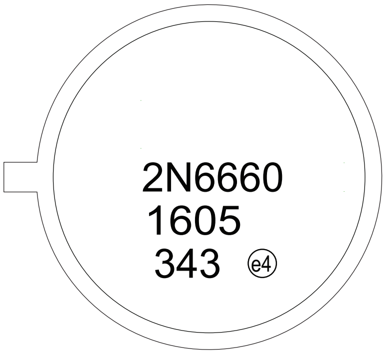
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

3-Lead TO-39



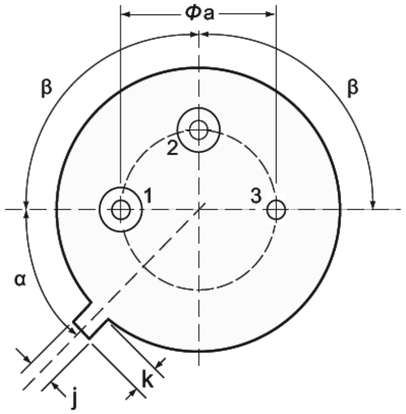
Example



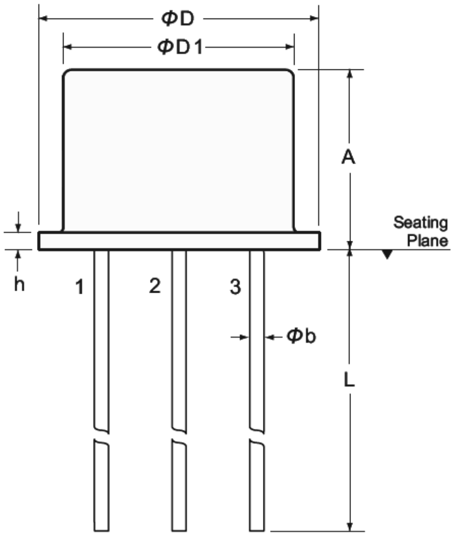
Legend:		
	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	e3	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.

3-Lead TO-39 Package Outline (N2)



Bottom View



Side View

Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Symbol		α	β	A	Φa	Φb	ΦD	ΦD1	h	j	k	L
Dimension (inches)	MIN	45º NOM	90º NOM	.240	.190	.016	.350	.315	.009	.028	.029	.500
	NOM			-	-	-	-	-	-	-	-	-
	MAX			.260	.210	.021	.370	.335	.125	.034	.040	.560*

JEDEC Registration TO-39.
** This dimension is not specified in the JEDEC drawing.*
Drawings not to scale.

APPENDIX A: REVISION HISTORY

Revision A (March 2016)

- Converted Supertex Doc #DSFP-2N6660 to Microchip DS20005509A.
- Minor text changes throughout.
- Update to **Features**.

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	XX	-	X	-	X
Device	Package Options		Environmental		Media Type

Device: 2N6660 = N-Channel, Enhancement-Mode, Vertical DMOS FET

Package: (blank) = TO-39, 3-lead

Environmental (blank) = Lead (Pb)-free/ROHS-compliant package

Media Type: (blank) = 500/Bag for TO-39 packages

Examples:

a)	2N6660	TO-39 package, 500/bag

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