

DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max $T_A = +25^\circ C$
60V	7.5Ω @ $V_{GS} = 5V$	0.23A

Features and Benefits

- Dual N-Channel MOSFET
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The 2N7002DWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

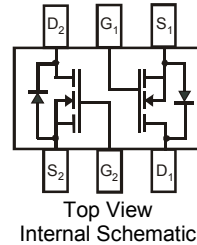
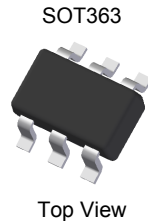
Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

- Motor Control
- Power Management Functions

Mechanical Data

- Case: SOT363
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Alloy 42 Lead-Frame (Lead Free Plating). Solderable per MIL-STD-202, Method 208 (E3)
- Terminal Connections: See Diagram
- Weight: 0.006 grams (Approximate)

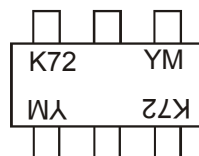


Ordering Information (Note 4)

Part Number	Case	Packaging
2N7002DWQ-7-F	SOT363	3,000/Tape & Reel
2N7002DWQ-13-F	SOT363	10,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K72 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: I = 2021)
 M = Month (ex: 9 = September)

Date Code Key

Year	1998	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	J	I	J	K	L	M	N	O	P	R	S

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Drain-Gate Voltage $R_{GS} \leq 1.0\text{M}\Omega$	V_{DGR}	60	V
Gate-Source Voltage	Continuous	V_{GSS}	± 20 V
	Pulsed	V_{GSS}	± 40 V
Continuous Drain Current (Note 6) $V_{GS} = 5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	0.23
		$T_A = +70^\circ\text{C}$	0.18
		$T_A = +100^\circ\text{C}$	0.14
Maximum Continuous Body Diode Forward Current (Note 6)	I_S	0.23	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)	I_{DM}	0.8	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	$T_A = +25^\circ\text{C}$	0.31
		$T_A = +70^\circ\text{C}$	0.2
		$T_A = +100^\circ\text{C}$	0.12
Thermal Resistance, Junction to Ambient (Note 5)	Steady State $R_{\theta JA}$	410	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	P_D	$T_A = +25^\circ\text{C}$	0.4
		$T_A = +70^\circ\text{C}$	0.25
		$T_A = +100^\circ\text{C}$	0.15
Thermal Resistance, Junction to Ambient (Note 6)	Steady State $R_{\theta JA}$	318	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 6)	Steady State $R_{\theta JC}$	135	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	70	—	V	$V_{GS} = 0\text{V}, I_D = 10\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1.0 500	μA	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$ @ $T_C = +25^\circ\text{C}$ @ $T_C = +125^\circ\text{C}$
Gate-Body Leakage	I_{GSS}	—	—	± 10	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	3.2	7.5	Ω	$V_{GS} = 5.0\text{V}, I_D = 0.05\text{A}$
		—	4.4	13.5		$V_{GS} = 10\text{V}, I_D = 0.5\text{A}$
On-State Drain Current	$I_{D(ON)}$	0.5	1.0	—	A	$V_{GS} = 10\text{V}, V_{DS} = 7.5\text{V}$
Forward Transconductance	g_{FS}	80	—	—	mS	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$
Diode Forward Voltage	V_{SD}	—	0.78	1.5	V	$V_{GS} = 0\text{V}, I_S = 115\text{mA}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{ISS}	—	22	50	pF	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{OSS}	—	11	25	pF	
Reverse Transfer Capacitance	C_{RSS}	—	2.0	5.0	pF	
Turn-On Delay Time	$t_{D(ON)}$	—	7.0	20	ns	$V_{DD} = 30\text{V}, I_D = 0.2\text{A},$ $R_L = 150\Omega, V_{GEN} = 10\text{V},$ $R_{GEN} = 25\Omega$
Turn-Off Delay Time	$t_{D(OFF)}$	—	11.0	20		

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

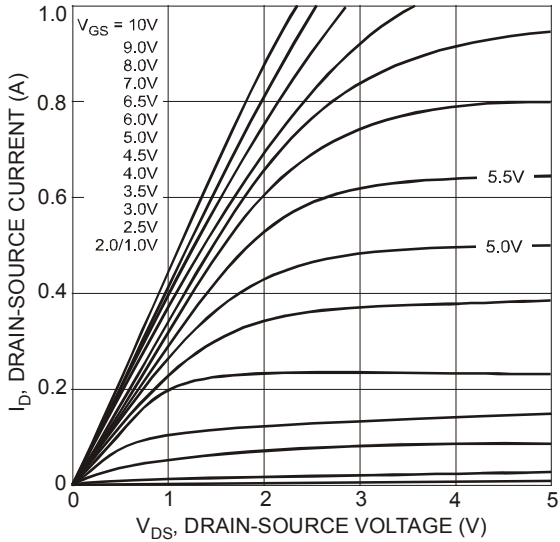


Figure 1 On-Region Characteristics

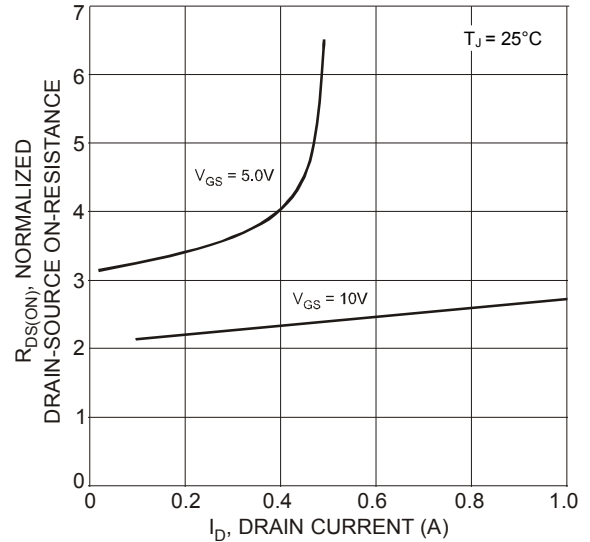


Figure 2 On-Resistance vs. Drain Current

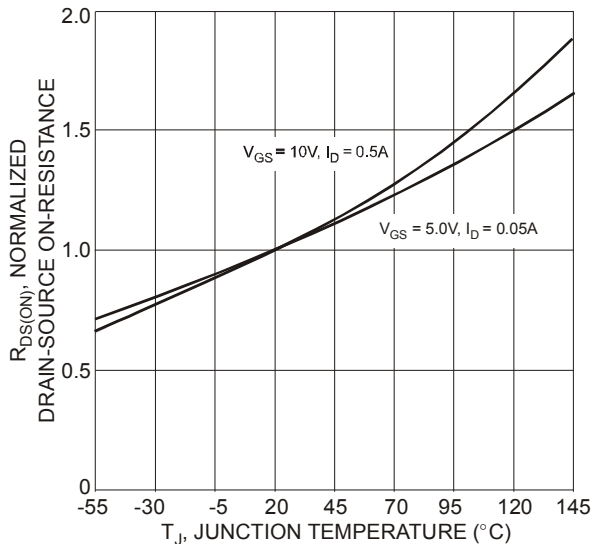


Figure 3 On-Resistance vs. Junction Temperature

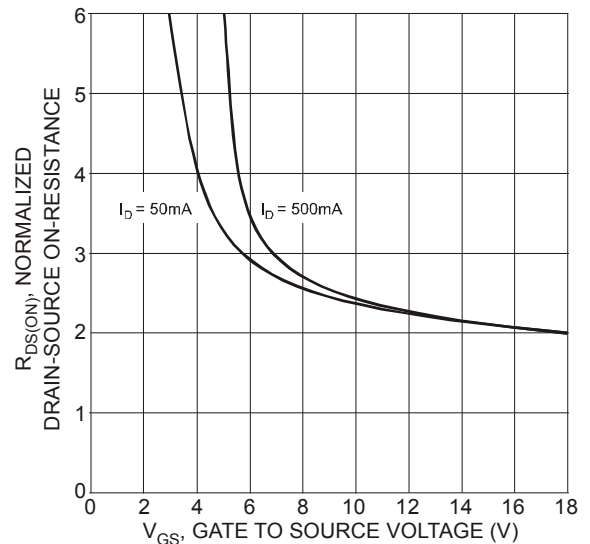


Figure 4 On-Resistance vs. Gate-Source Voltage

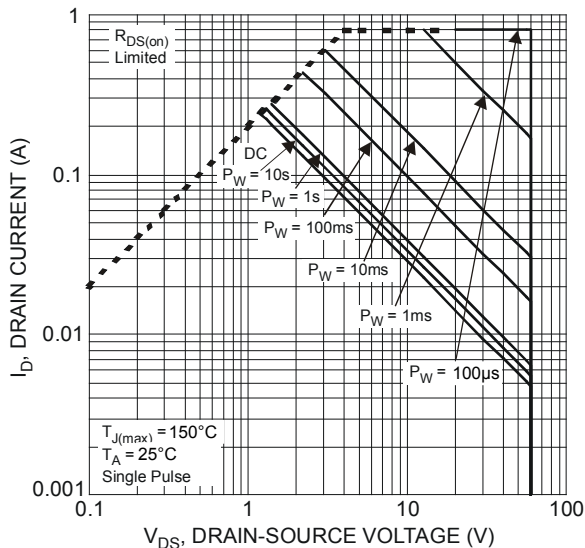
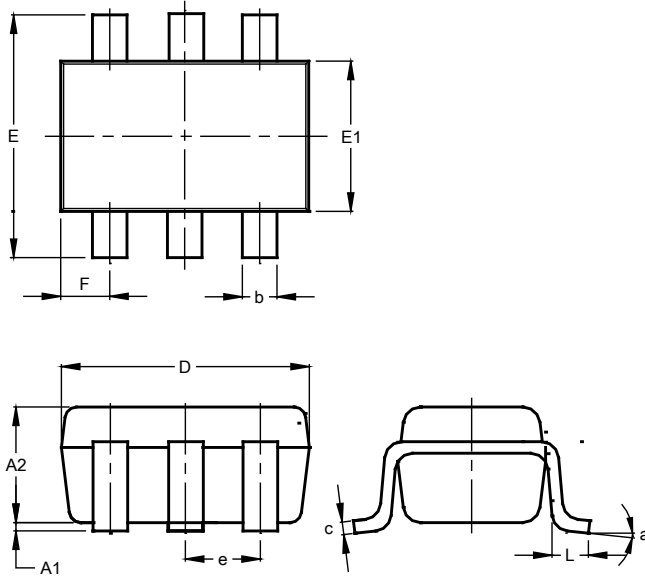


Figure 5 SOA, Safe Operation Area

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363

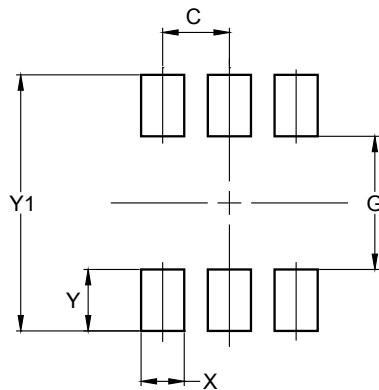


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT363



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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