

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
60V	7.5Ω @ V _{GS} = 5V	0.23A

Description and Applications

This MOSFET has been designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor Control
- Power Management Functions

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)**
- For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>
- An Automotive-Compliant Part is Available Under Separate Datasheet ([2N7002DWQ](#))

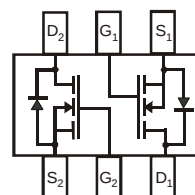
Mechanical Data

- Package: SOT363
- Package 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)

SOT363 (Standard)



Top View



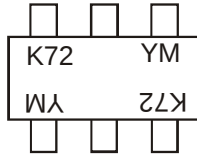
Top View
Internal Schematic

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
2N7002DW-7-F	SOT363 (Standard)	3,000	Tape & Reel
2N7002DW-13-F	SOT363 (Standard)	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 or $\bar{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2004	...	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	R	...	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} ≤ 1.0MΩ			V _{DGR}	60	V
Gate-Source Voltage	Continuous(Note 7)		V _{GSS}	±20	V
	Pulsed (Note 8)		V _{GSS}	±40	V
Continuous Drain Current (Note 6) V _{GS} = 5V	Steady State	T _A = +25°C	I _D	0.23	A
		T _A = +70°C		0.18	
		T _A = +100°C		0.14	
Maximum Continuous Body Diode Forward Current (Note 6)			I _S	0.23	A
Pulsed Drain Current (10μs 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)	$T_A = +25^\circ\text{C}$	P_D	0.31	W
	$T_A = +70^\circ\text{C}$		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)	$T_A = +25^\circ\text{C}$	P_D	0.4	W
	$T_A = +70^\circ\text{C}$		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	$^\circ\text{C}$

- 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.
 - Recommended $I_{GSS} < \pm 50\text{mA}$.
 - Guaranteed by design. Not subject to product testing. For single pulse only.

Electrical Characteristics (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	70	—	V	V _{GS} = 0V, I _D = 10μA
Zero Gate Voltage Drain Current @ T _C = +25°C @ T _C = +125°C	I _{DSS}	—	—	1.0 500	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Body Leakage	I _{GSS}	—	—	±10	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1.0	—	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance @ T _J = +25°C @ T _J = +125°C	R _{DS(ON)}	—	3.2 4.4	7.5 13.5	Ω	V _{GS} = 5.0V, I _D = 0.05A V _{GS} = 10V, I _D = 0.5A
On-State Drain Current	I _{D(ON)}	0.5	1.0	—	A	V _{GS} = 10V, V _{DS} = 7.5V
Forward Transconductance	g _{FS}	80	—	—	mS	V _{DS} = 10V, I _D = 0.2A
Diode Forward Voltage	V _{SD}	—	0.78	1.5	V	V _{GS} = 0V, I _S = 115mA
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	22	50	pF	V _{DS} = 25V, V _{GS} = 0V f = 1.0MHz
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} = 30V, I _D = 0.2A, R _L = 150Ω, V _{GEN} = 10V, R _{GEN} = 25Ω
Turn-Off Delay Time	t _{D(OFF)}	—	11.0	20		

Notes: 9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.

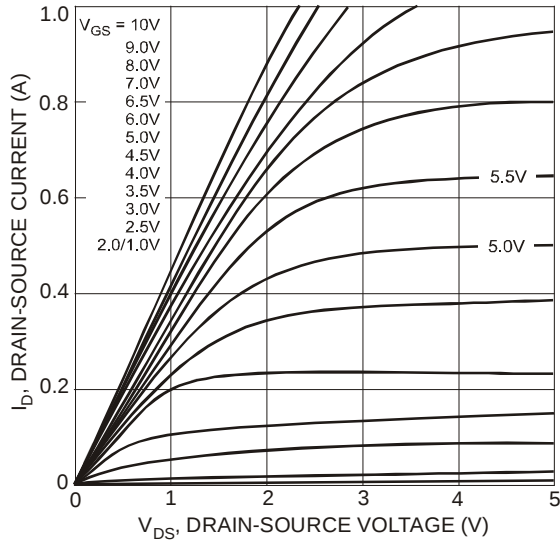


Figure 1 On-Region Characteristics

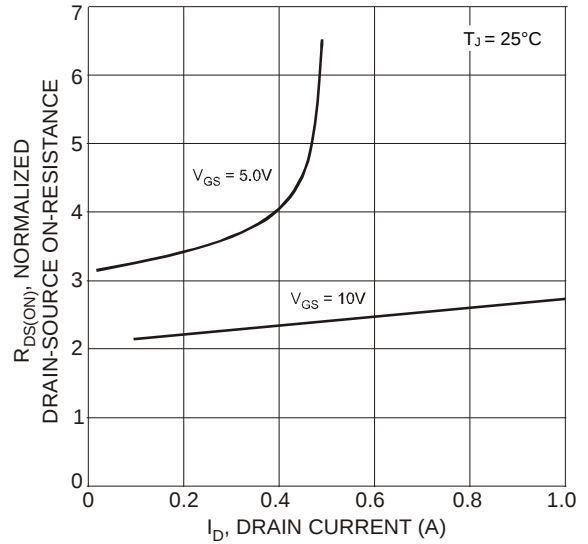


Figure 2 On-Resistance vs. Drain Current

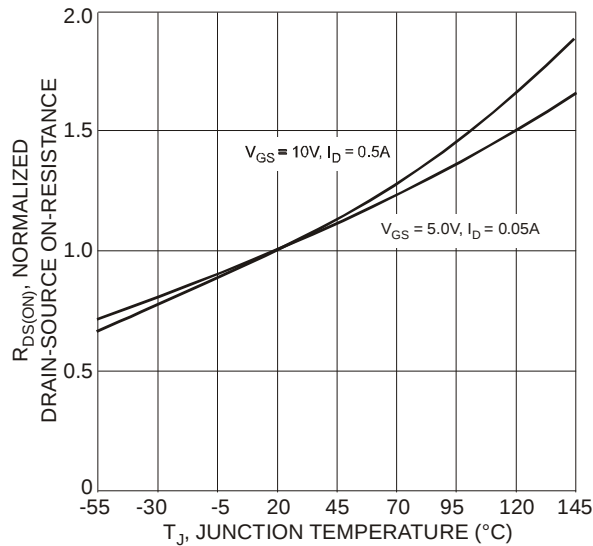


Figure 3 On-Resistance vs. Junction Temperature

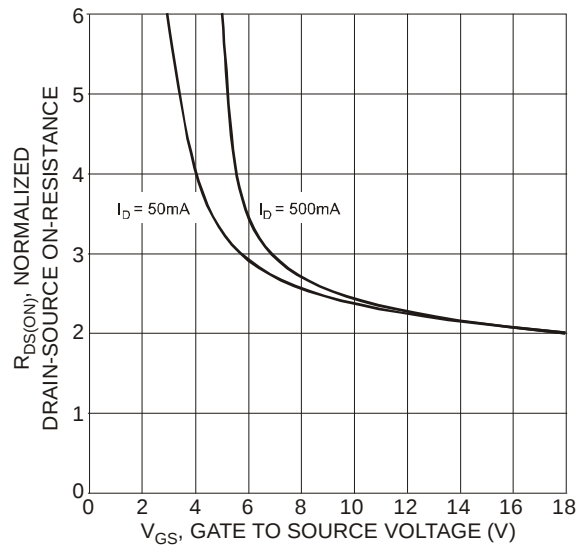


Figure 4 On-Resistance vs. Gate-Source Voltage

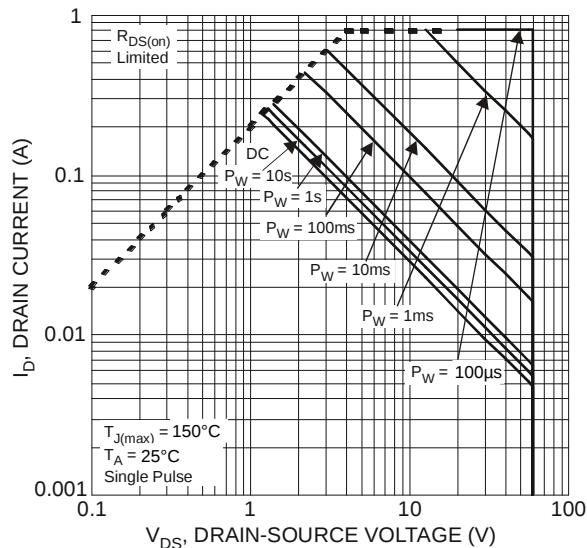
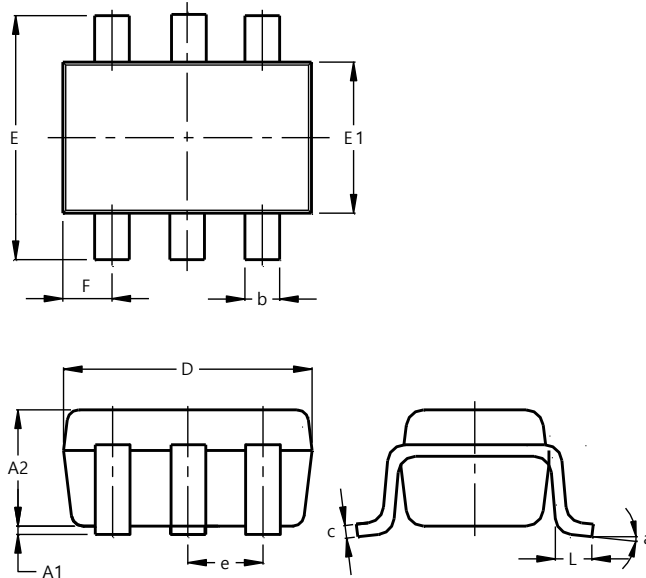


Figure 5 SOA, Safe Operation Area

Package Outline Dimensions

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

SOT363 (Standard)

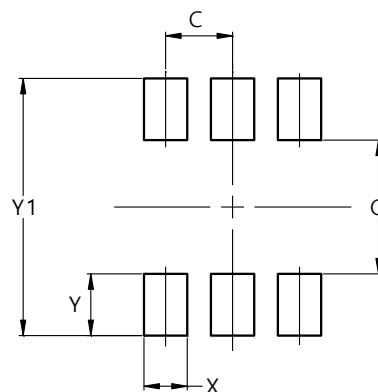


SOT363 (Standard)			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.80	1.00	0.90
b	0.10	0.35	0.225
c	0.08	0.22	0.15
D	1.80	2.20	2.00
E	2.00	2.45	2.225
E1	1.15	1.35	1.25
e	--	--	0.65
F	0.25	0.45	0.35
L	0.25	0.46	0.355
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT363 (Standard)



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

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