

ESD



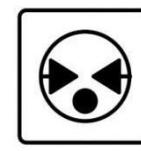
TVS



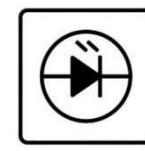
TSS



MOV



GDT



PLED

**2N7002DW-7-F-MS**

**Product specification**



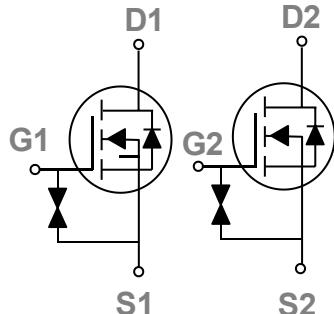
## General Features

- 60V, 0.3A,  $R_{DS(ON)} = 1.8\Omega$  @  $V_{GS} = 10V$   
Improved dv/dt capability
- Fast switching
- Green Device Available
- G-S ESD Protection Diode Embedded

## Application

- Motor Drive
- Power Tools
- LED Lighting

## Reference News

PACKAGE OUTLINE	Pin Configuration	Marking
 SOT-363		K72**

**Absolute Maximum Ratings (TA=25°C unless otherwise)**

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain- Source Voltage	60	V
V <sub>GS</sub>	Gate- Source Voltage	±20	V
I <sub>D</sub>	Drain Current – Continuous (TA=25°C)	0.3	A
	Drain Current – Continuous (TA=70°C)	0.24	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	1.2	A
P <sub>D</sub>	Power Dissipation (TA=25°C)	0.28	W
	Power Dissipation – Derate above 25°C	0.002	W/°C
T <sub>STG</sub>	Storage Temperature Range	-50 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-50 to 150	°C

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	450	°C/W

**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted) Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain- Source Breakdown Voltage	VGS=0V , ID=250uA	60	---	---	V
△BVDSS/△T <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, ID=1 mA	---	0.04	---	V/°C
IDSS	Drain- Source Leakage Current	VDS=60V , VGS=0V , TJ=25	---	---	1u	A
		VDS=48V , VGS=0V , TJ=125	---	---	100u	A
IGSS	Gate- Source Leakage Current	VGS= ±20V , VDS=0V	---	---	±10	A

**On Characteristics**

RDS(ON)	Static Drain- Source On-Resistance	VGS=10V , ID=0.3A	---	1.8	2.8	Ω
		VGS=4.5V , ID=0.2A	---	2.2	3	Ω
VGS(th)	Gate Threshold Voltage	VGS=VDS , ID =250uA	1	1.6	2.5	V
			---	-4	---	MV/°C
gfs	Forward Transconductance	VDS=10V , ID=0.1A	---	0.24	---	S

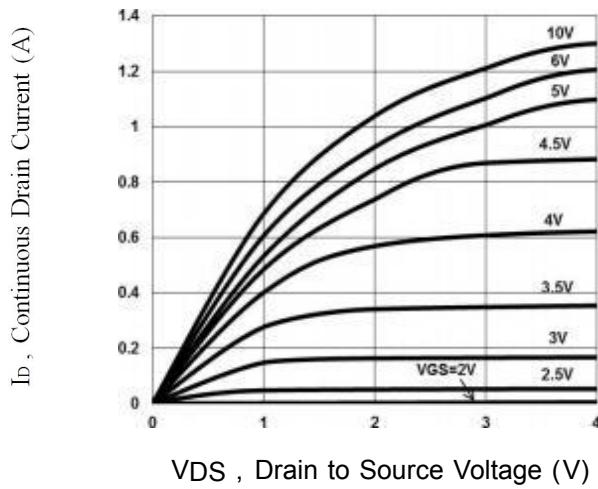
**Dynamic and switching Characteristics**

Qg	Total Gate Charge <sup>2 , 3</sup>	VDS=30V , VGS=10V , ID=0.2A	---	1.1		nC
Qgs	Gate-Source Charge <sup>2 , 3</sup>		---	0.1		
Qgd	Gate-Drain Charge <sup>2 , 3</sup>		---	0.23		
Td(on)	Turn-On Delay Time <sup>2 , 3</sup>	VDD=30V , VGS=10V , RG=6Ω ID=0.2A	---	3		nS
Tr	Rise Time <sup>2 , 3</sup>		---	5		
Td(off)	Turn-Off Delay Time <sup>2 , 3</sup>		---	14		
Tf	Fall Time <sup>2 , 3</sup>		---	9		
Ciss	Input Capacitance		---	30.6		pF
Coss	Output Capacitance	VDS=10V , VGS=0V , F=1MHz	---	5.5		
Crss	Reverse Transfer Capacitance		---	4		

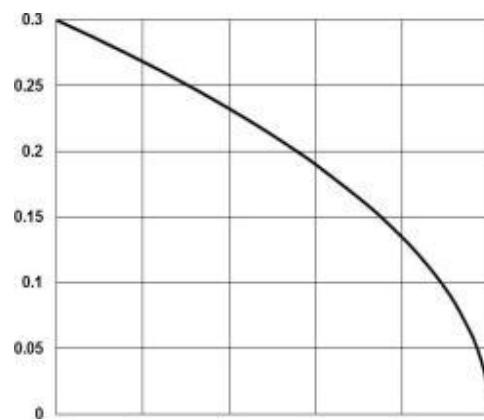
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
IS	Continuous Source Current	VG=VD=0V , Force Current	---	---	0.3	A
ISM	Pulsed Source Current		---	---	0.6	A
VSD	Diode Forward Voltage	VGS=0V , IS=1A , TJ=25	---	---	1.2	V

Note :

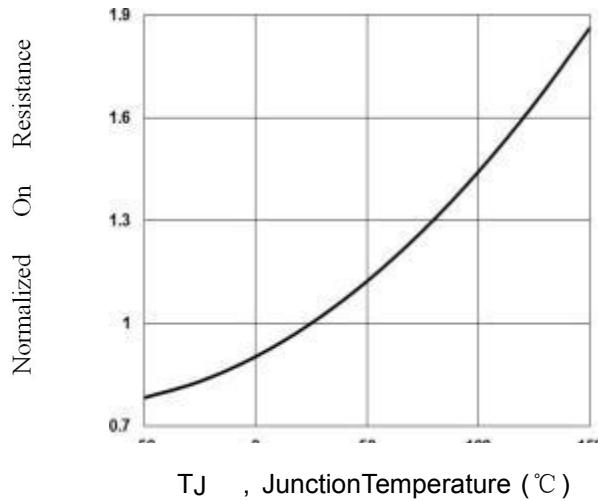
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq$  300us , duty cycle  $\leq$  2%.
3. Essentially independent of operating temperature.



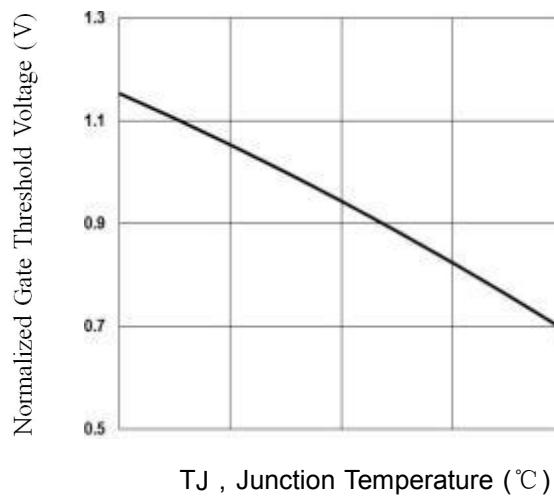
**Fig. 1 Output Characteristics**



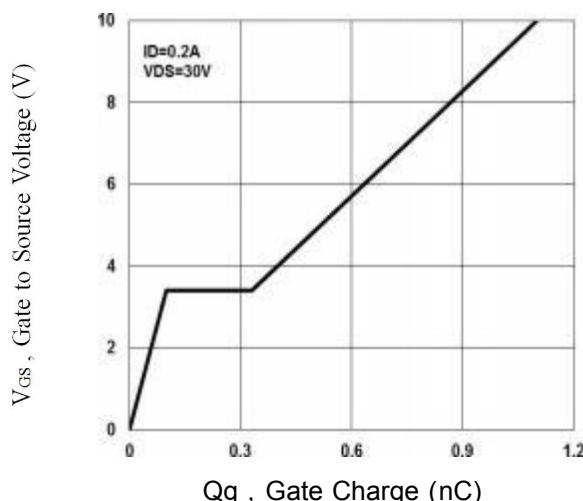
**Fig. 2 Continuous Drain Current vs.  $T_J$**



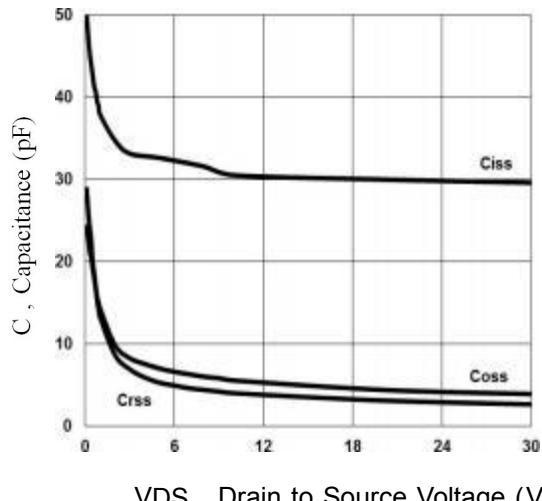
**Fig. 3 Normalized RDSON vs.  $T_J$**



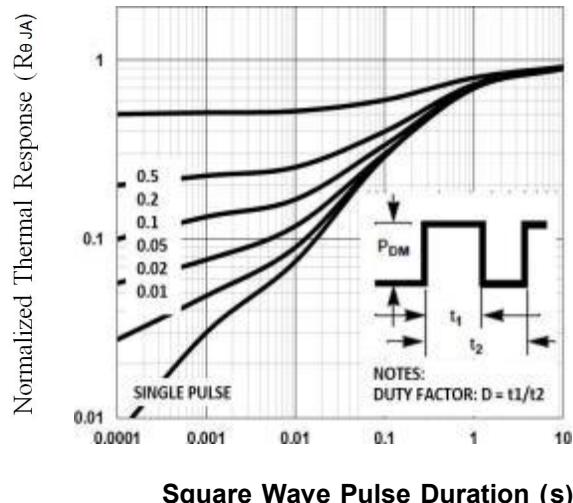
**Fig. 4 Normalized  $V_{th}$  vs.  $T_J$**



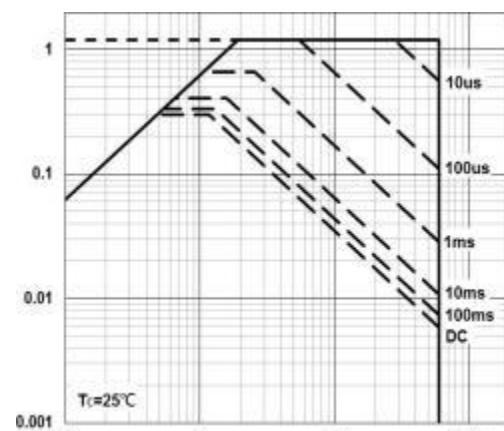
**Fig. 5 Gate Charge Waveform**



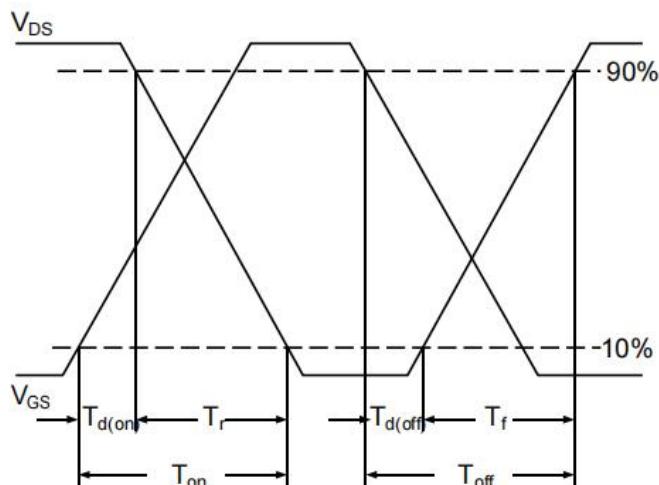
**Fig. 6 Capacitance Characteristics**



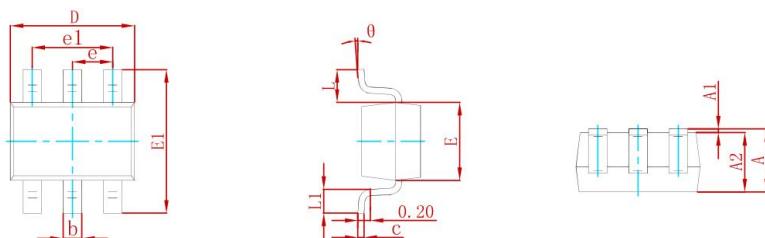
**Fig. 7 Normalized Transient Impedance**



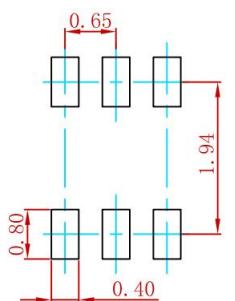
**Fig. 8 Maximum Safe Operation Area**



**Fig.9 Switching Time Waveform**

**PACKAGE MECHANICAL DATA**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.100	0.150	0.004	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.400	0.085	0.094
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

**Suggested Pad Layout**

**Note:**

1. Controlling dimension:In millimeters.
2. General tolerance: $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

**REEL**

P/N	PKG	QTY
2N7002DW-7-F-MS	SOT-363	3000

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