

General Description

This MOSFET uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.

Features

- Low gate charge
- High power and current handing capability
- Lead free product is acquired

Applications

- Load switch
- Battery protection
- Power management



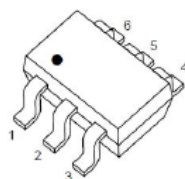
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(ON), max @ V_{GS}=10V}$	250	m Ω

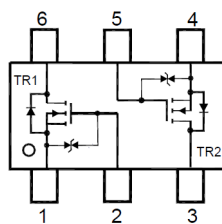
Marking Information

Product Name	Package	Marking
2N7002KDW	SOT-363	72K

Package & Pin information



SOT-363



Absolute Maximum Ratings at $T_J=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	340	mA
Pulsed Drain Current ¹⁾	$I_{D,pulse}$	1.35	A
Power Dissipation	P_D	0.15	W
Operation and storage temperature	T_{stg}, T_J	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-to-Ambient	$R_{\theta JA}$	833	$^{\circ}\text{C/W}$

Electrical Characteristics at $T_J=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	60			V	$V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	1.1	1.3	2.5	V	$V_{DS}=V_{GS}, I_D=1\text{ mA}$
Drain-source on-state resistance	$R_{DS(ON)}$		0.9	2.5	Ω	$V_{GS}=10\text{ V}, I_D=0.5\text{ A}$
Drain-source on-state resistance	$R_{DS(ON)}$		1.1	3	Ω	$V_{GS}=4.5\text{ V}, I_D=0.2\text{ A}$
Gate-source leakage current	I_{GSS}			10	μA	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$
				-10		$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=48\text{ V}, V_{GS}=0\text{ V}$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		30		pF	$V_{GS}=0\text{ V}$, $V_{DS}=25\text{ V}$, $f=1.0\text{ MHz}$
Output capacitance	C_{oss}		4.2		pF	
Reverse transfer capacitance	C_{rss}		2.9		pF	
Turn-on Delay Time	$t_{d(on)}$		3.9		ns	$V_{GS}=10\text{ V}$, $V_{DD}=30\text{ V}$, $I_D=0.2\text{ A}$, $R_{GEN}=25\text{ }\Omega$
Turn-on Rise Time	t_r		3.4		ns	
Turn-Off Delay Time	$t_{d(off)}$		15.7		ns	
Turn-Off Fall Time	t_f		9.9		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total Gate Charge	Q_g		0.3		nC	$V_{GS}=4.5\text{ V}$, $V_{DS}=10\text{ V}$, $I_D=0.25\text{ A}$
Gate-Source Charge	Q_{gs}		0.2		nC	
Gate-Drain Charge	Q_{gd}		0.08		nC	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Source drain current (Body Diode)	I_{SD}			340	mA	$T_A=25^\circ\text{C}$
Diode forward voltage ²⁾	V_{SD}			1.5	V	$I_S=0.5\text{ A}$, $V_{GS}=0\text{ V}$

Note: 1) Pulse width limited by maximum allowable junction temperature.

2) Repetitive Rating: Pulse width limited by maximum junction temperature.

Electrical Characteristics Diagrams

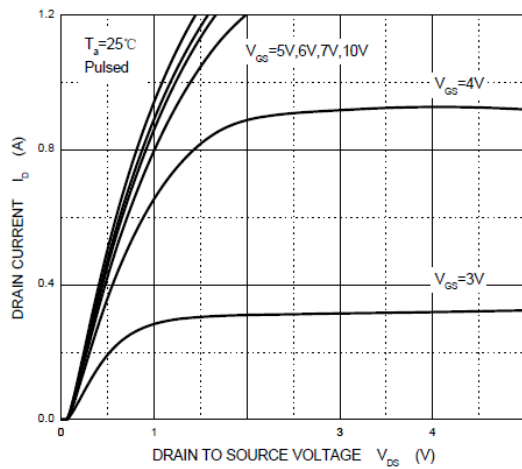


Figure 1. Typ. output characteristics

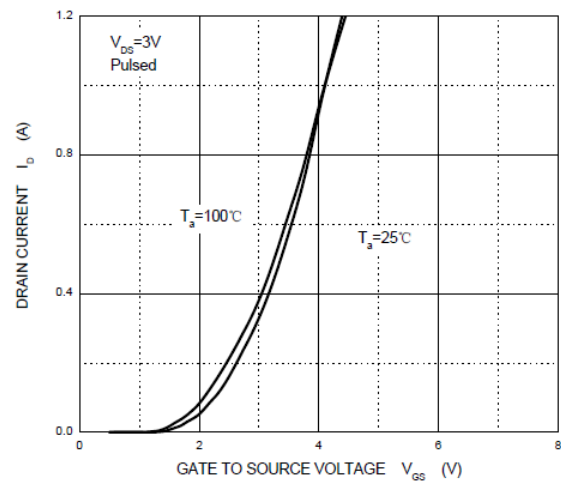


Figure 2. Typ. transfer characteristics

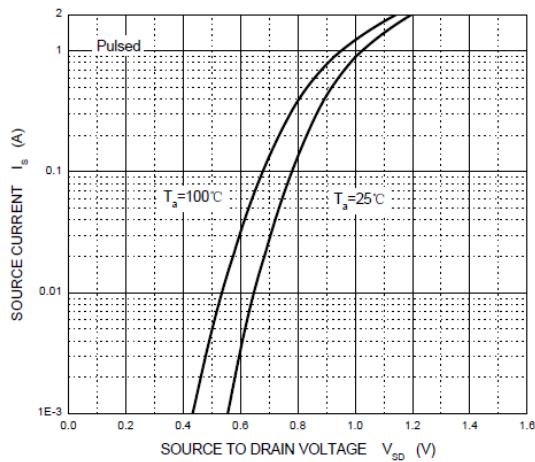


Figure 3. I_s vs V_{sd}

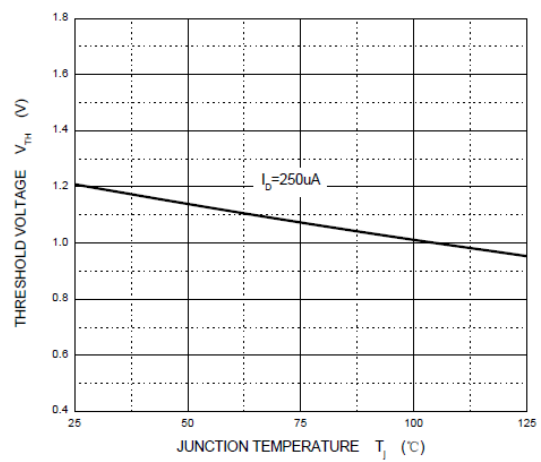


Figure 4. V_{th} vs Junction temperature

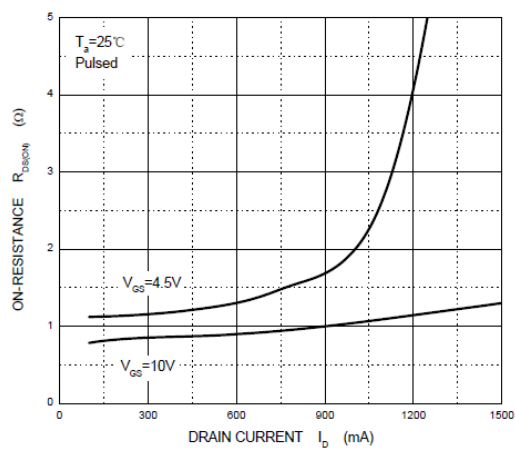


Figure 5. Drain-Source on Resistance

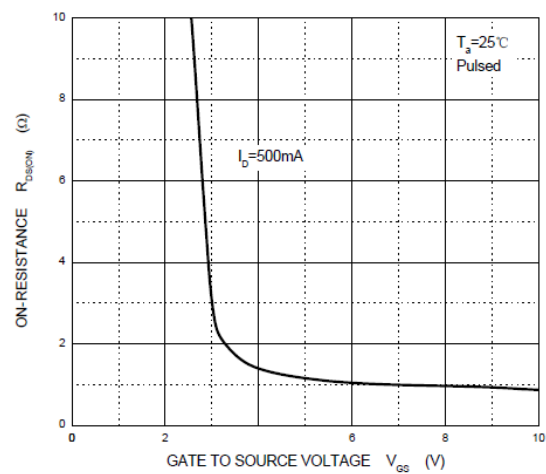
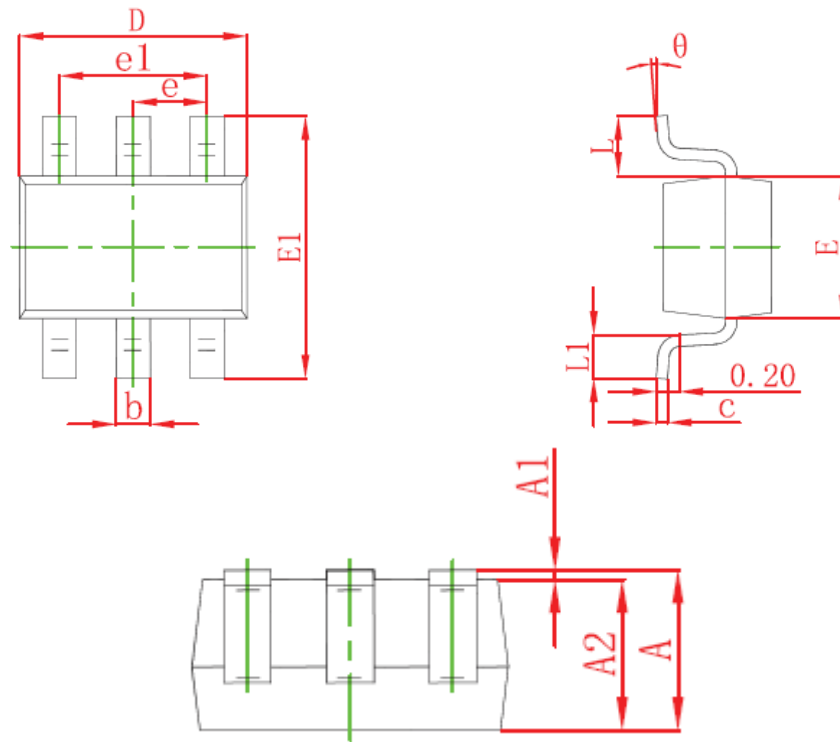
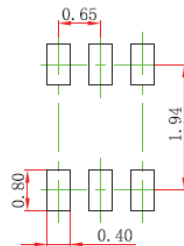


Figure 6. $R_{DS(ON)}$ vs V_{gs}

Package Information



SOT-363 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.

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°

Version: SOT-363-V package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
SOT-363	3000	15	45000	4	180000

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