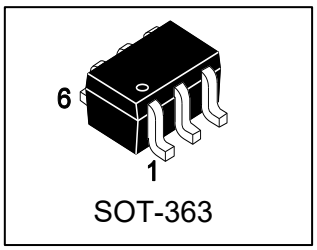
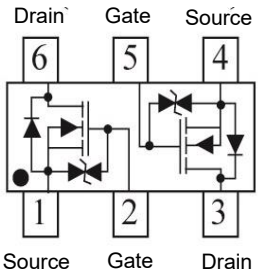
2N7002SD
S-2N7002SD

Small Signal MOSFET
380 mA, 60V N–Channel SOT-363





1. FEATURES

- We declare that the material of product compliance with RoHS requirements and Halogen Free.
- S- prefix for automotive and other applications requiring unique site and control change requirements; AEC-Q101 qualified and PPAP capable.
- ESD protected
- Low RDS(on)

2. APPLICATIONS

- Low side load switch
- Level shift circuits
- DC−DC converter
- Portable applications i.e. DSC, PDA, Cell Phone, etc.

3. DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
2N7002SD	701	3000/Tape&Reel

4. MAXIMUM RATINGS(Ta = 25ºC)

Parameter		Symbol	Limits	Unit
Drain–Source Voltage		VDSS	60	V
Gate-Source Voltage		VGS	±20	V
Drain Current		ID		mA
– Steady State	TA = 25°C		320	
	TA = 85°C		230	
– t<5s	TA = 25°C		380	
	TA = 85°C		270	
Pulsed Drain Current (tp=10μs)		IDM	1.5	A
Source Current (Body Diode)		IS	300	mA

5. THERMAL CHARACTERISTICS

Parameter	Symbol	Limits	Unit
Total Device Dissipation(Note 1) – Steady State – t<5s	PD	 300 	mW
Junction−to−Ambient(Note 1) – Steady State – t<5s	RΘJA	 417 300	ºC/W
Lead Temperature for Soldering Purposes (1/8 " from case for 10 s)	TL	260	° C
Junction and Storage temperature	TJ,Tstg	−55~+150	° C
Gate−Source ESD Rating(HBM, Method 3015)	ESD	2000	V

6. ELECTRICAL CHARACTERISTICS (Ta= 25ºC)

OFF CHARACTERISTICS

Characteristic		Symbol	Min.	Typ.	Max.	Unit
Drain–Source Breakdown Voltage (VGS = 0, ID = 250μA)		VBRDSS	60	-	-	V
Drain−to−Source Breakdown Voltage Temperature Coefficient		VBRDSS/TJ	-	71	-	mV/° C
Zero Gate Voltage Drain Current	TJ = 25°C	IDSS	-	-	1.0	μA
(VGS = 0, VDS = 60 V)	TJ = 125°C				500	
(VGS = 0, VDS = 50 V)	TJ = 25°C		-	-	100	nA
Gate–Body Leakage Current, Forward (VGS = 20 V)		IGSSF	-	-	10	μA
Gate–Body Leakage Current, Reverse (VGS = - 20 V)		IGSSR	-	-	-10	μA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage (VDS = VGS, ID = 250μA)		VGS(th)	1.0	-	2.0	V
Negative Threshold Temperature Coefficient		VGS(TH)/TJ	-	4	-	mV/° C
Static Drain–Source On–State Resistance		RDS(on)				Ω
(VGS = 10 V, ID = 500 mA)			-	-	2.8	
(VGS = 4.5 V, ID = 200 mA)			-	-	3.2	
Forward Transconductance (VDS = 5.0 V, ID = 200 mA)		gfs	80	-	-	mS

DYNAMIC CHARACTERISTICS

Input Capacitance (VDS = 25 V, VGS = 0, f = 1.0 MHz)		Ciss	-	-	35	pF
Output Capacitance (VDS = 25 V, VGS = 0, f = 1.0 MHz)		Coss	-	-	10	pF
Reverse Transfer Capacitance (VDS = 25 V, VGS = 0, f = 1.0 MHz)		Crss	-	-	5	pF
Total Gate Charge	VGS = 4.5 V, VDS = 10 V; ID= 500 mA	QG(TOT)	-	0.44	-	nC
Gate−to−Source Charge		QGS	-	0.2	-	
Gate−to−Drain Charge		QGD	-	0.1	-	

6. ELECTRICAL CHARACTERISTICS (Ta= 25°C)(Con.)

SWITCHING CHARACTERISTICS

Turn-On Delay Time	VDS = 30 V, VGEN = 10 V, ID = 500 mA,RG =25Ω ,RL =60Ω	td(on)	-	2.7	-	ns
Rise Time		tr	-	2.5	-	
Turn-Off Delay Time		td(off)	-	13	-	
Fall Time		tf	-	8	-	

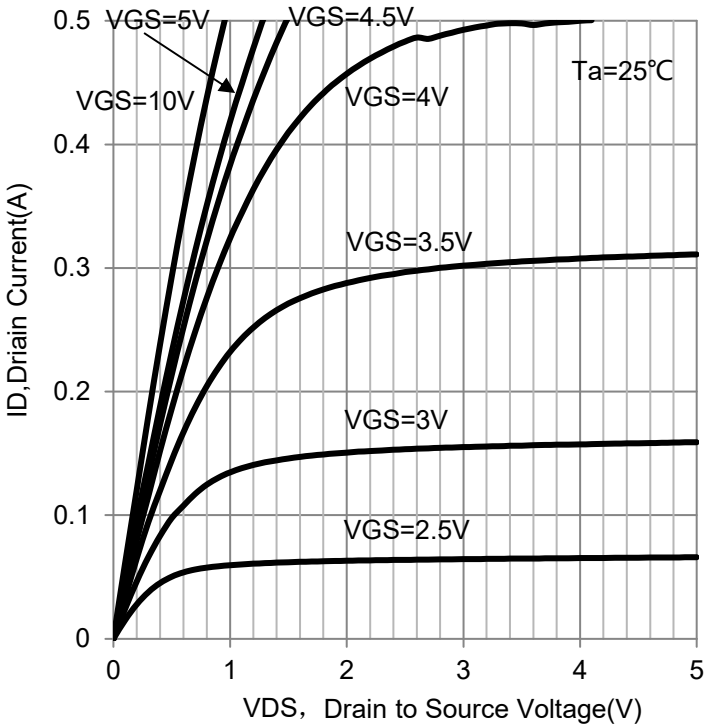
BODY–DRAIN DIODE RATINGS

Diode Forward On–Voltage (IS = 0.5A, VGS = 0 V)	VSD	-	0.85	-	V

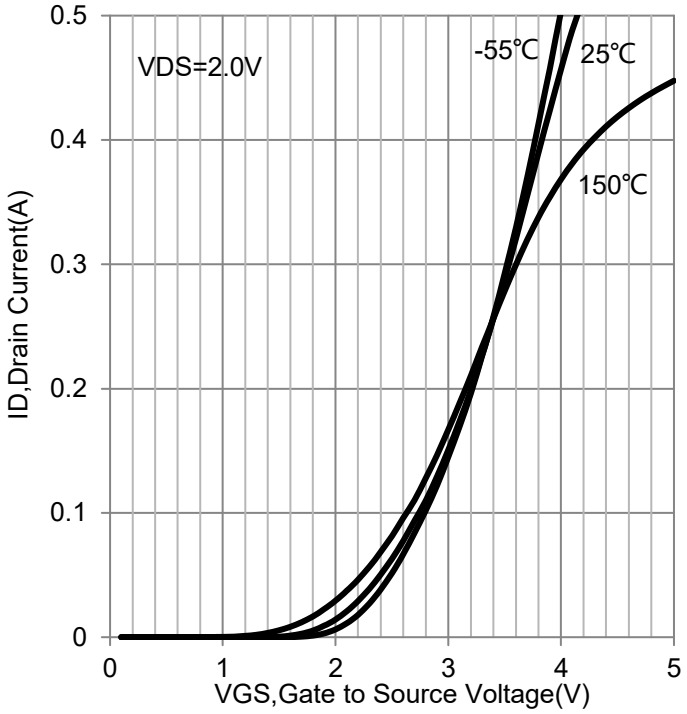
1. FR–4 = 1.0×0.75×0.062 in.

2.Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

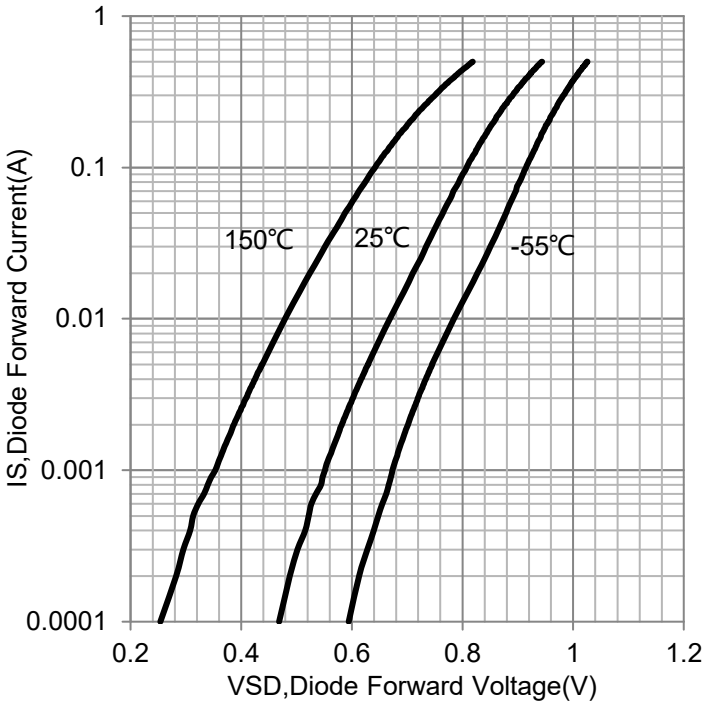
7. ELECTRICAL CHARACTERISTICS CURVES



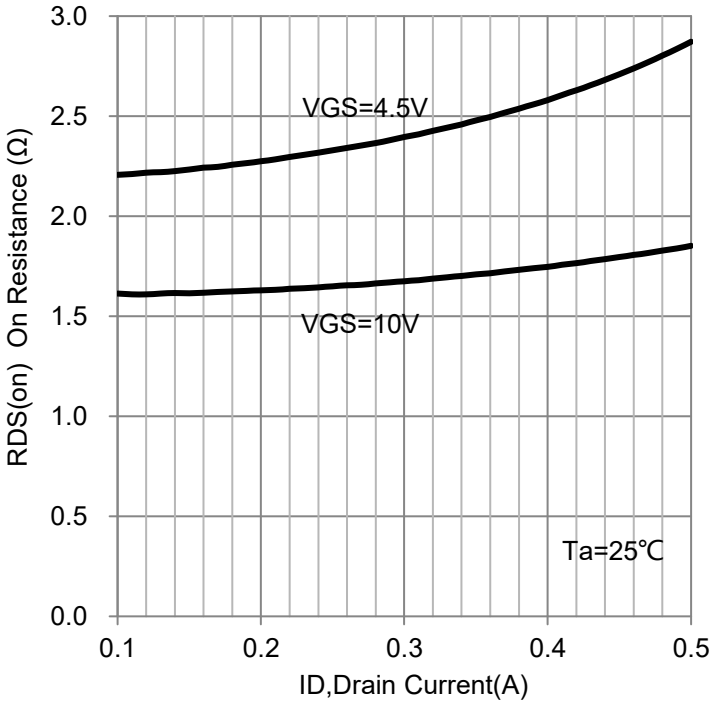
ID vs. VDS



ID vs. VGS

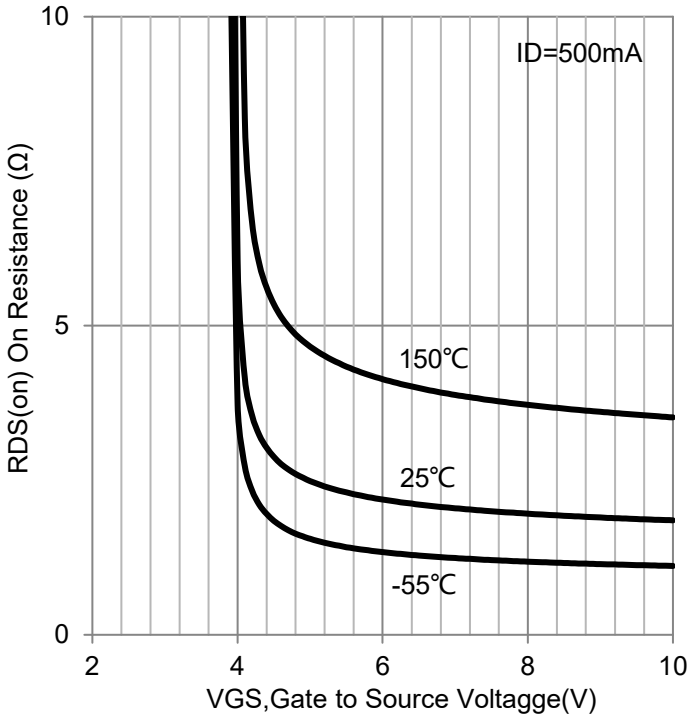


IS vs. VSD

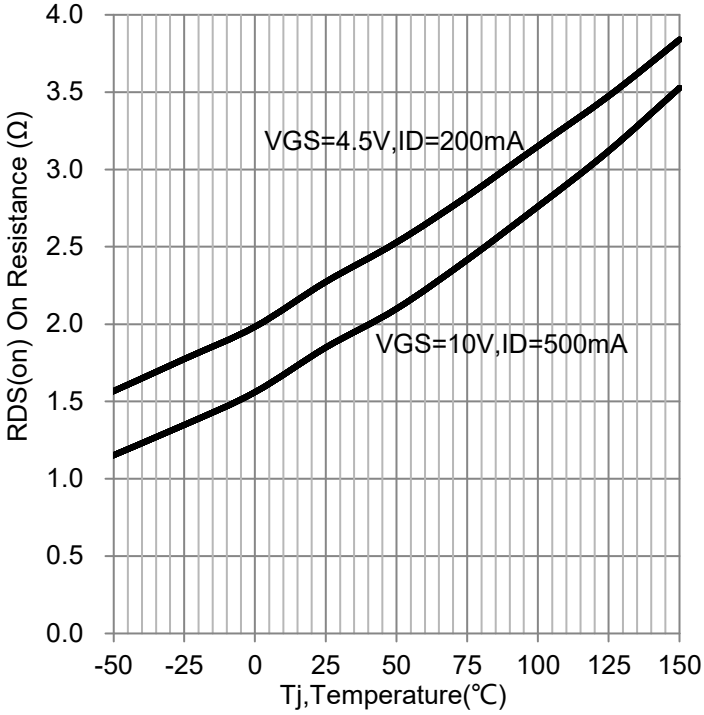


RDS(on) vs. ID

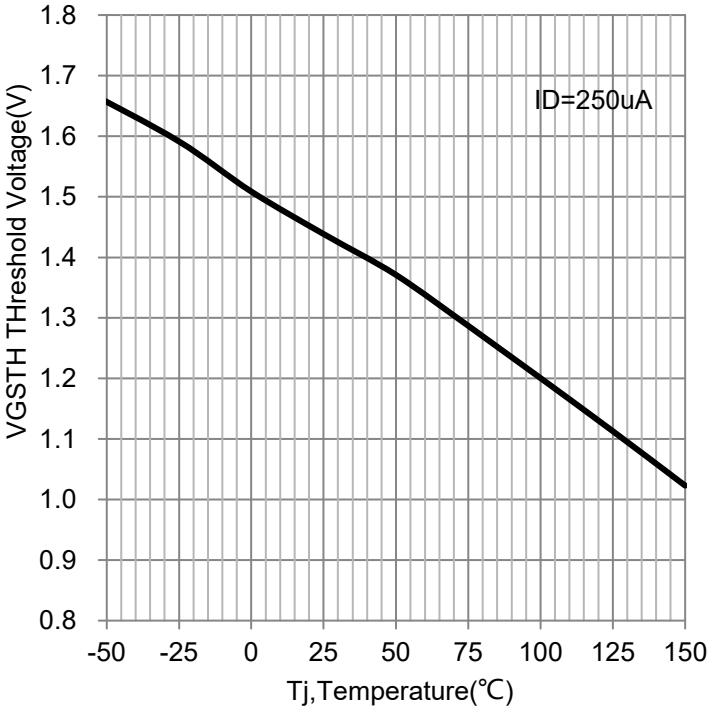
7. ELECTRICAL CHARACTERISTICS CURVES(Con.)



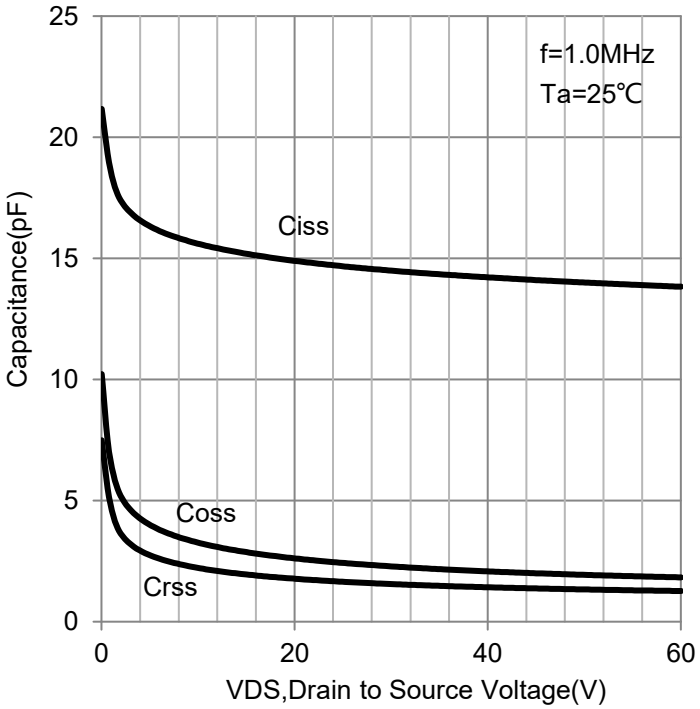
RDSON vs. VGS



RDS(on) vs. Tj

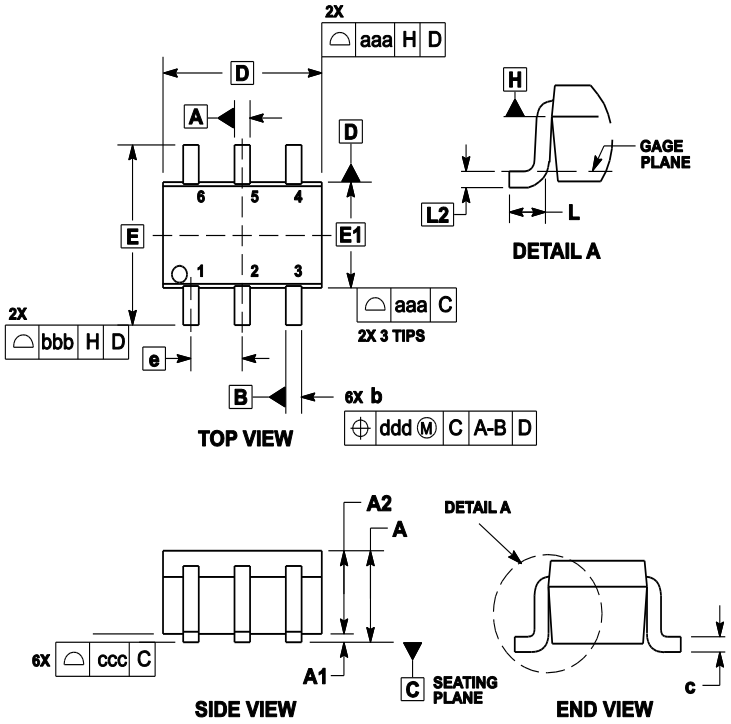


VGSTH vs. Tj



Capacitance

8.OUTLINE AND DIMENSIONS



Notes:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.043
A1	0.00	---	0.10	0	---	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.01
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.07	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.01		
bbb	0.30			0.01		
ccc	0.10			0.00		
ddd	0.10			0.00		

9.SOLDERING FOOTPRINT