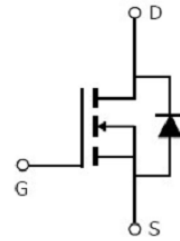


Main Product Characteristics:

V_{DSS}	600V
$R_{DS(on)}$	3.7ohm(typ.)
I_D	2A


TO-252

**Marking and pin
Assignment**

Schematic diagram
Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature


Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute max Rating:

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	2	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	1.3	
I_{DM}	Pulsed Drain Current②	8	
$P_D @ TC = 25^\circ C$	Power Dissipation③	23	W
	Linear Derating Factor	0.18	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=10mH	54.4	mJ
I_{AS}	Avalanche Current @ L=10mH	3.3	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

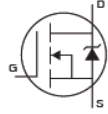
Thermal Resistance

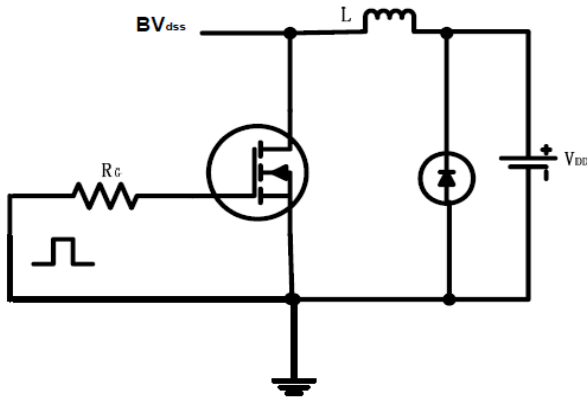
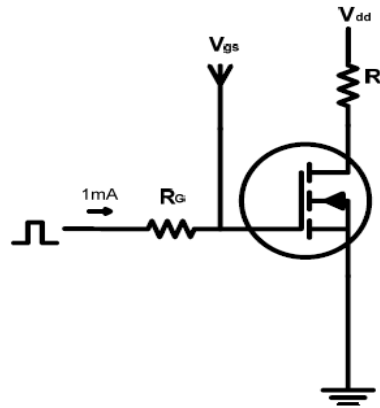
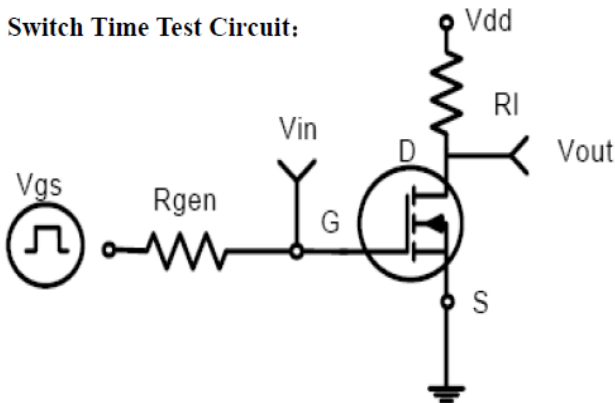
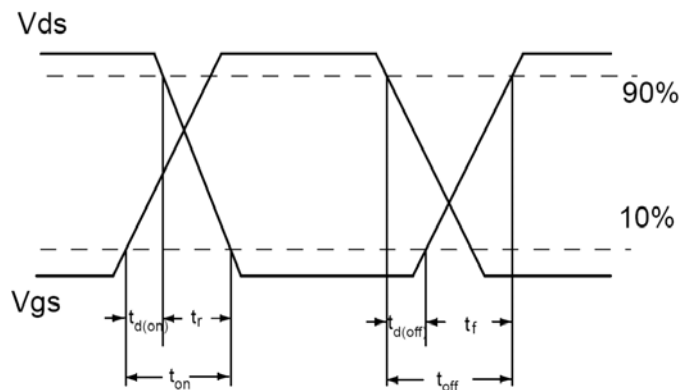
Symbol	Characterizes	Typ.	Max.	Units
R _{θJC}	Junction-to-case ^③	—	5.5	°C/W
R _{θJA}	Junction-to-ambient (t ≤ 10s) ^④	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

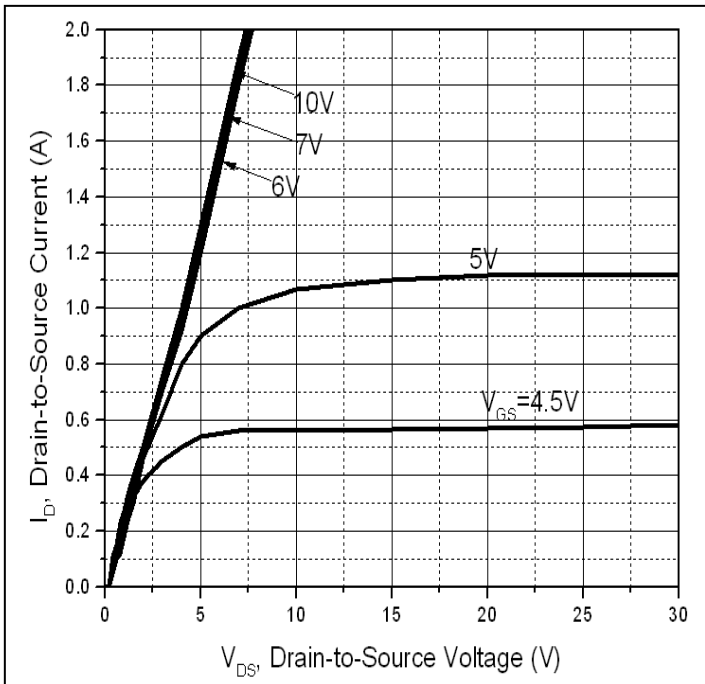
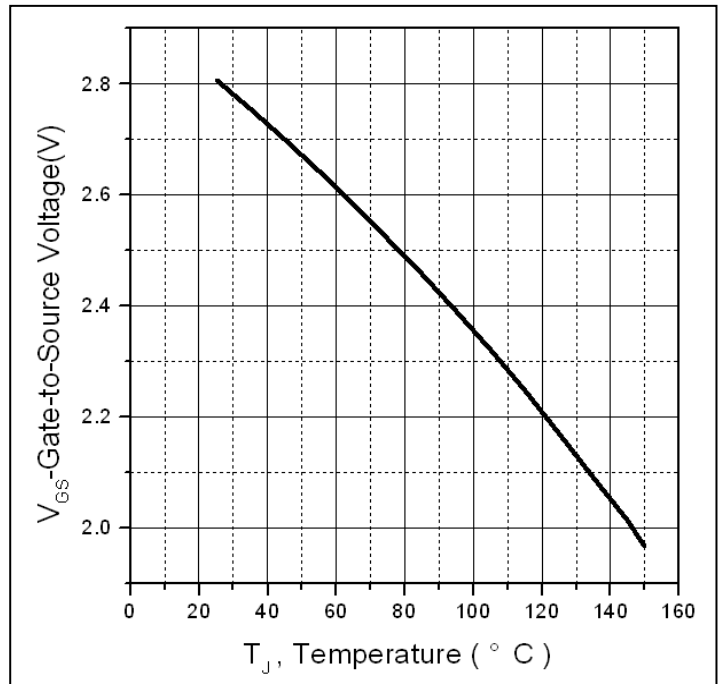
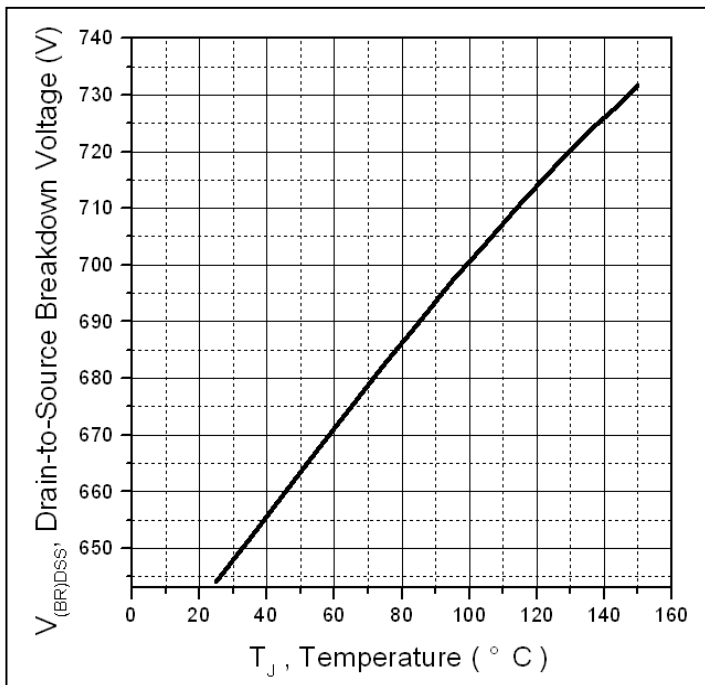
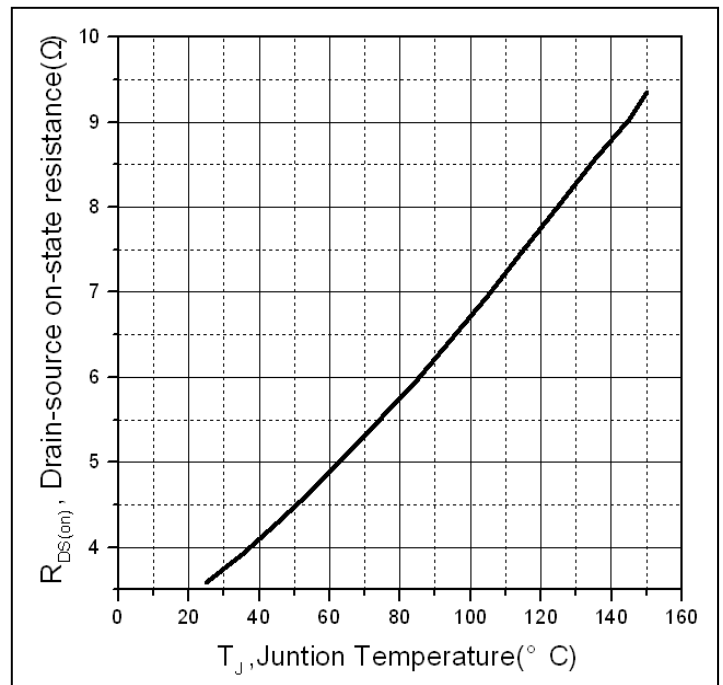
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source breakdown voltage	600	—	—	V	V _{GS} = 0V, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source on-resistance	—	3.7	4	Ω	V _{GS} =10V, I _D = 1A
V _{GS(th)}	Gate threshold voltage	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA T _J = 125°C
		—	2.4	—		
I _{DSS}	Drain-to-Source leakage current	—	—	1	μA	V _{DS} = 600V, V _{GS} = 0V T _J = 125°C
		—	—	50		
I _{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V _{GS} = 30V
		—	—	-100		V _{GS} = -30V
Q _g	Total gate charge	—	11.5	—	nC	I _D = 2A, V _{DS} =480V, V _{GS} = 10V
Q _{gs}	Gate-to-Source charge	—	2.7	—		
Q _{gd}	Gate-to-Drain("Miller") charge	—	4.5	—		
t _{d(on)}	Turn-on delay time	—	9.4	—	ns	V _{GS} =10V, V _{DS} =300V, R _L =150Ω, R _{GEN} =25Ω I _D =2A
t _r	Rise time	—	7.4	—		
t _{d(off)}	Turn-Off delay time	—	25.4	—		
t _f	Fall time	—	20.8	—		
C _{iss}	Input capacitance	—	274	—	pF	V _{GS} = 0V V _{DS} = 25V f = 1MHz
C _{oss}	Output capacitance	—	31	—		
C _{rss}	Reverse transfer capacitance	—	4	—		

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	2	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode)	—	—	8	A	
V _{SD}	Diode Forward Voltage	—	0.86	1	V	I _S =2A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	—	259.3	—	ns	T _J = 25°C, I _F = 2A, di/dt = 100A/μs
Q _{rr}	Reverse Recovery Charge	—	1419	—	nC	

Test circuits and Waveforms
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Switch Waveforms:

Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ C$

Typical electrical and thermal characteristics

Figure 1: Typical Output Characteristics

Figure 2. Gate to source cut-off voltage

Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

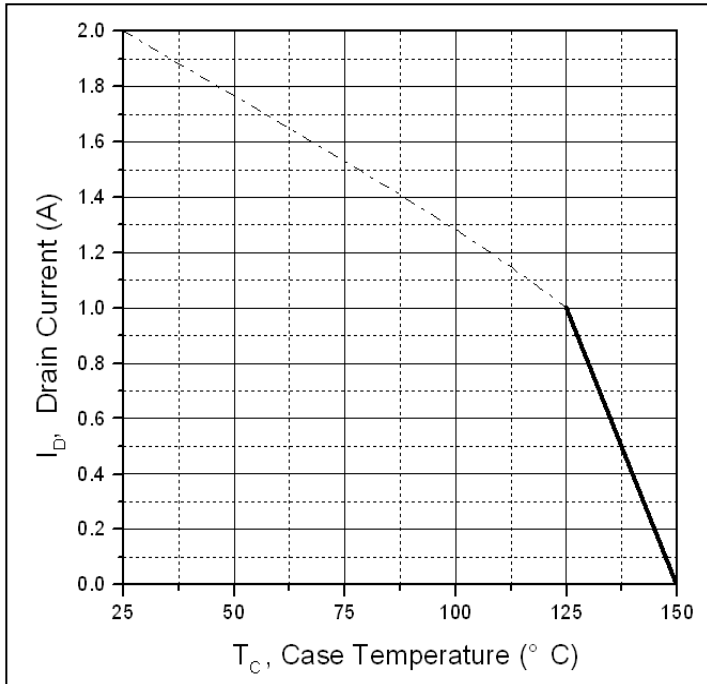


Figure 5. Maximum Drain Current Vs. Case Temperature

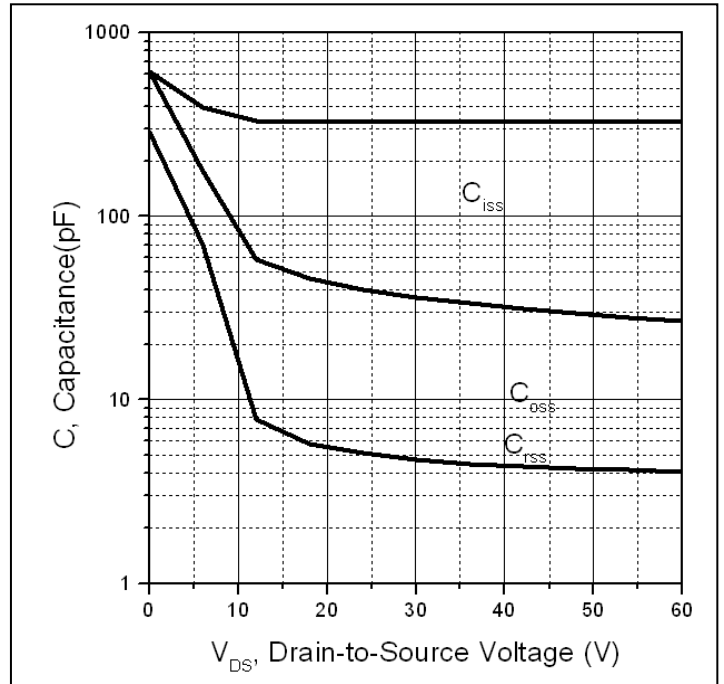


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

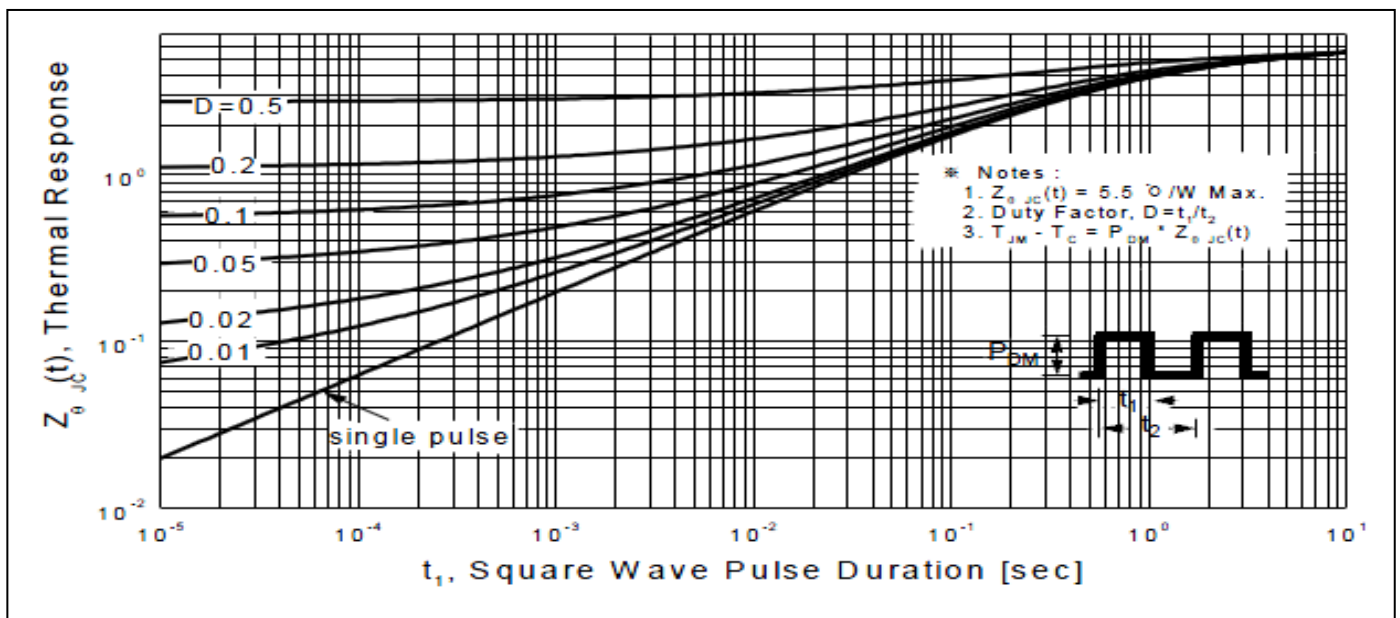
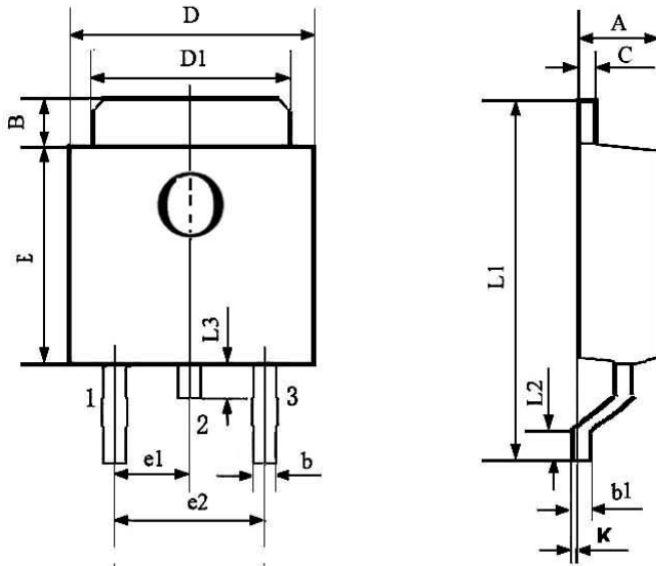
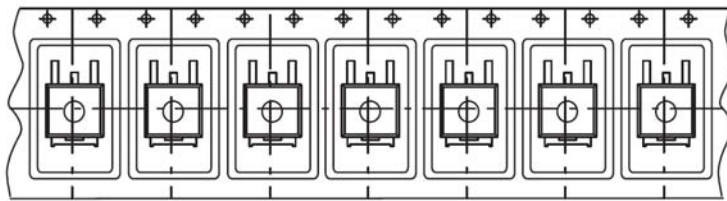
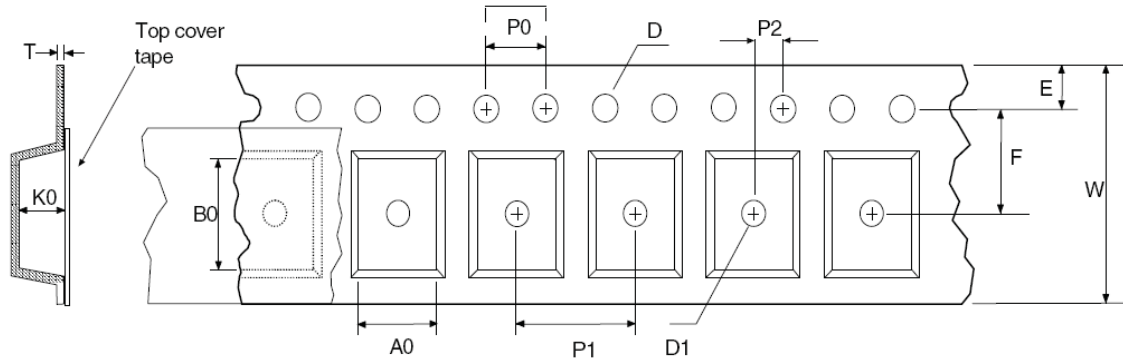


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:
TO-252 PACKAGE OUTLINE DIMENSION


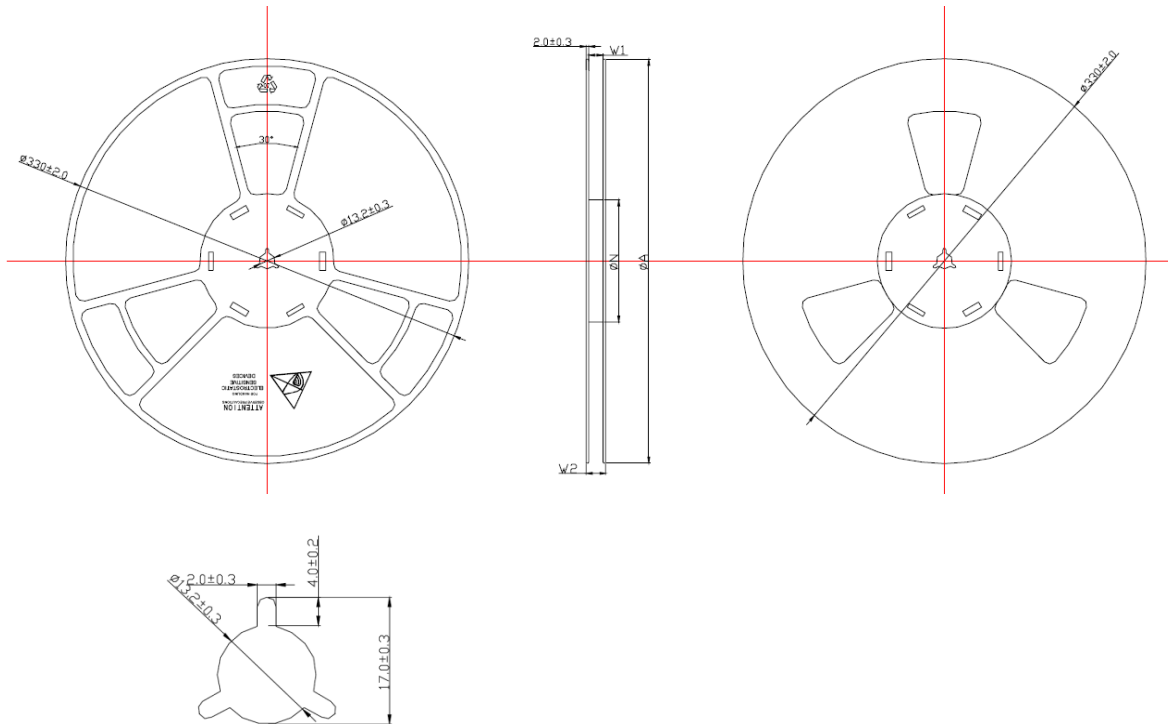
Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.200	-	2.400	0.087	-	0.094
B	0.950	-	1.250	0.037	-	0.049
b	0.500	-	0.700	0.020	-	0.028
b1	0.450	-	0.550	0.018	-	0.022
C	0.450	-	0.550	0.018	-	0.022
D	6.450	-	6.750	0.254	-	0.266
D1	5.200	-	5.400	0.205	-	0.213
E	5.950	-	6.250	0.234	-	0.246
e1	2.240	-	2.340	0.088	-	0.092
e2	4.430	-	4.730	0.174	-	0.186
L1	9.450	-	9.950	0.372	-	0.392
L2	1.250	-	1.750	0.049	-	0.069
L3	0.600	-	0.900	0.024	-	0.035
K	0.000	-	0.100	0.000	-	0.004

Tape Information for TO-252


User direction of feed

Symbol	Dimension In Millimeters		
	Min	Nom	Max
T	0.280	0.30	0.320
K0	2.600	2.70	2.800
P0	3.900	4.00	4.100
P1	7.900	8.00	8.100
P2	1.950	2.00	2.050
D	Φ1.5 Ref.		
D1	Φ1.4	Φ1.5	Φ1.6
A0	6.800	6.90	7.000
B0	10.400	10.50	10.600
E	1.650	1.75	1.850
F	7.450	7.50	7.550
W	15.900	16	16.300

Reel Information for TO-252



PRODUCT SPECIFICATIONS				
TYPE WIDTH	∅A	∅N	W1 (Min)	W2 (Max)
12MM	330±2.0	100±1.0	12.4	19.4
16mm	330±2.0	100±1.0	16.4	23.4
24MM	330±2.0	100±1.0	24.4	31.4
32MM	330±2.0	100±1.0	32.4	39.4
44MM	330±2.0	100±1.0	44.4	51.4

Ordering and Marking Information

Device Marking: SSF2N60CD

Package (Available)
TO-252
Operating Temperature Range
C : -55 to 150 °C

Devices per Unit

Package Type	Units/Tape	Tapes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO-252	2500	2	5000	7	35000
TO-252	2500	1	2500	10	25000
TO-252	800	5	4000	8	32000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to 150°C @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=150^{\circ}\text{C}$ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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