

Description:

This 2N+2P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge.

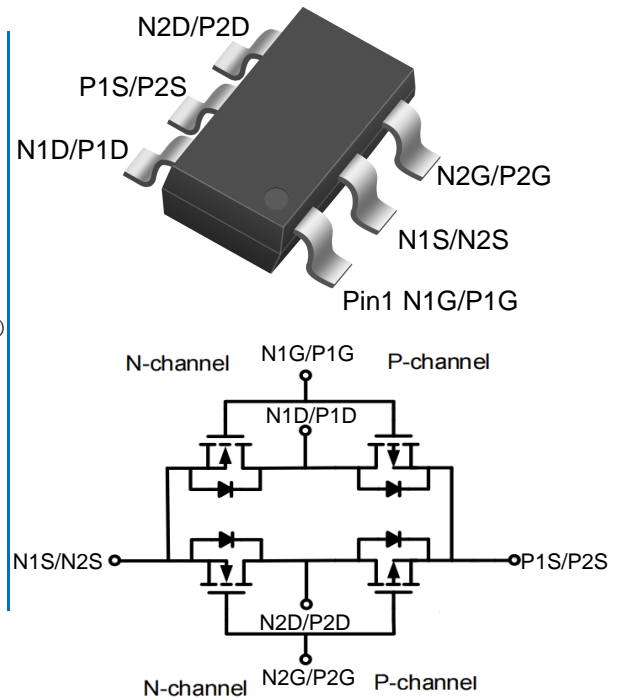
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=20V, I_D=2A, R_{DS(ON)} < 55m\Omega @ V_{GS}=4.5V$ (Typ: $42m\Omega$)

P-Channel: $V_{DS}=-20V, I_D=-2A, R_{DS(ON)} < 120m\Omega @ V_{GS}=-4.5V$ (Typ: $90m\Omega$)

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(ON)}$.
- 4) Excellent package for good heat dissipation.
- 5) MSL3



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
DO02B02A	02B02A	SOT-23-6D	3000pcs/Reel

Absolute Maximum Ratings: ($T_A=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	± 12	± 12	V
I_D	Continuous Drain Current- $T_A=25^\circ C^1$	2	-2	A
	Continuous Drain Current- $T_A=100^\circ C^1$	1.4	-1.4	
I_{DM}	Pulsed Drain Current ²	8	-8	A
P_D	Power Dissipation	1.2	1	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	103	125	$^\circ C/W$

N-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	20	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=20V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	0.5	0.76	1	V
$R_{DS(on)}$	Drain-Source On Resistance ³	$V_{GS}=4.5V, I_D=3A$	---	42	55	$\text{m}\Omega$
		$V_{GS}=2.5V, I_D=2A$	---	55	70	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=10V, V_{GS}=0V, f=1\text{MHz}$	---	150	---	pF
C_{oss}	Output Capacitance		---	36	---	
C_{rss}	Reverse Transfer Capacitance		---	29	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=10V, I_D=2A,$ $R_{ENG}=3\ \Omega, V_{GS}=4.5V$	---	3	---	ns
t_r	Rise Time		---	11	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	21	---	ns
t_f	Fall Time		---	8	---	ns
Q_g	Total Gate Charge	$V_{GS}=4.5V, V_{DS}=10V,$ $I_D=2A$	---	2.5	---	nC
Q_{gs}	Gate-Source Charge		---	0.5	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	0.7	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_{SD}=3A$	---	---	1.2	V
I_S	Continuous Drain Current	$V_D=V_G=0V$	---	---	2	A
I_{SM}	Pulsed Drain Current		---	---	8	A
T_{rr}	Reverse Recovery Time	$I_F=2A, T_J=25^\circ\text{C}$	---	4.3	---	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu\text{s}$	---	0.6	---	nC

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

N-Typical Characteristics: ($T_A=25^\circ C$ unless otherwise noted)

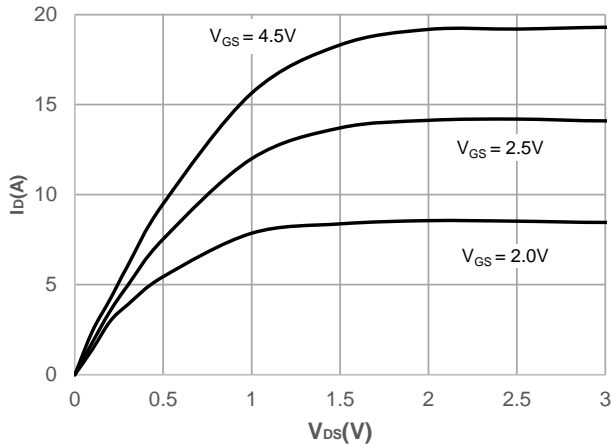


Figure 1: Output Characteristics

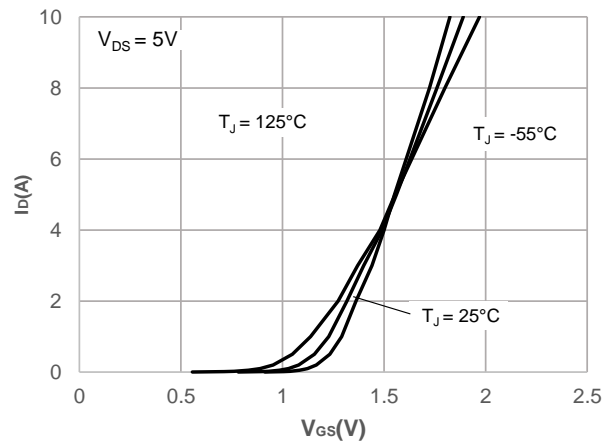


Figure 2: Typical Transfer Characteristics

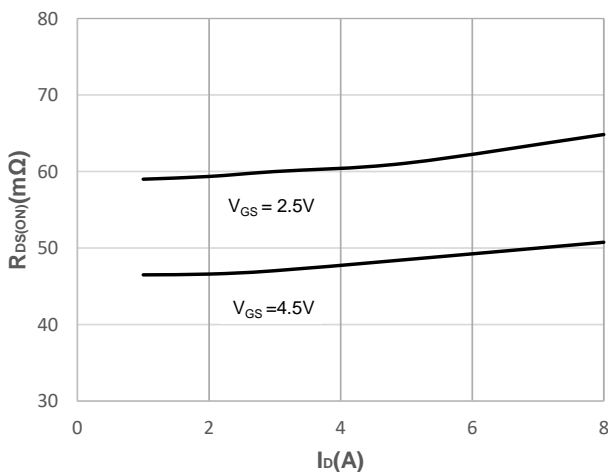


Figure 3: On-resistance vs. Drain Current

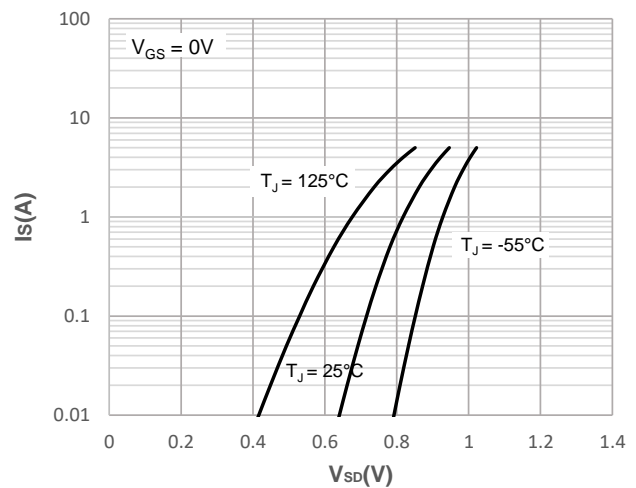


Figure 4: Body Diode Characteristics

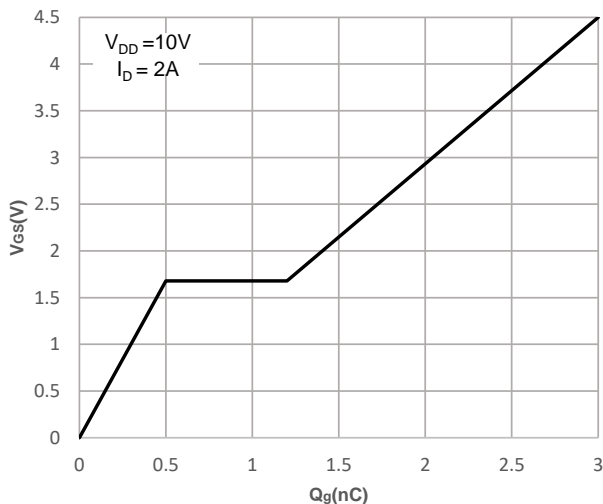


Figure 5: Gate Charge Characteristics

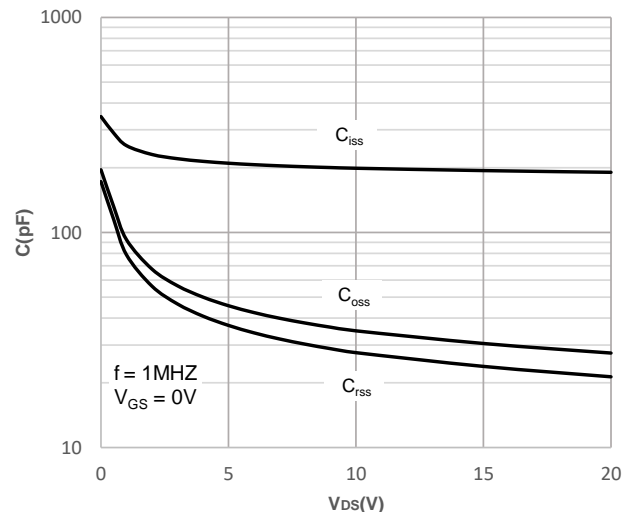


Figure 6: Capacitance Characteristics

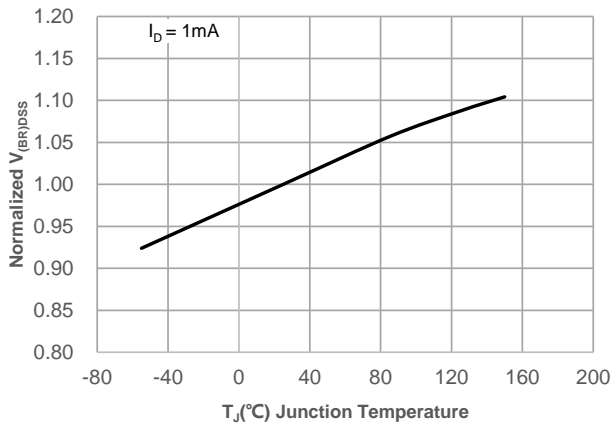


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

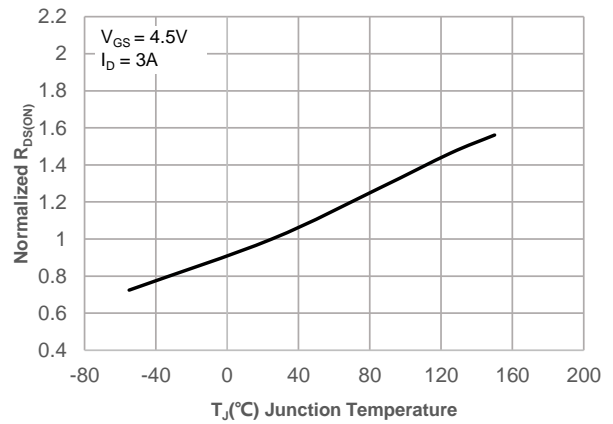


Figure 8: Normalized on Resistance vs. Junction Temperature

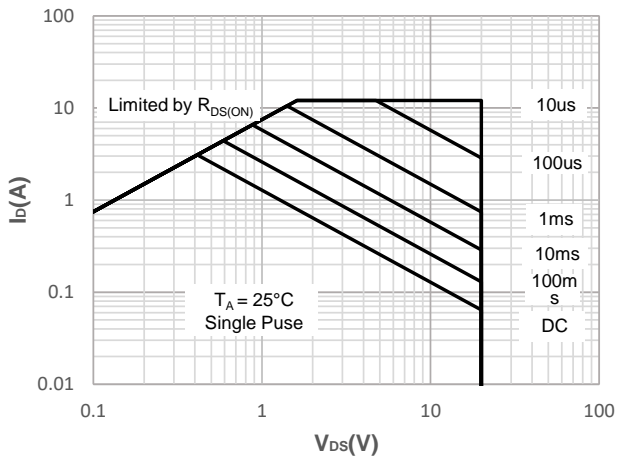


Figure 9: Maximum Safe Operating Area

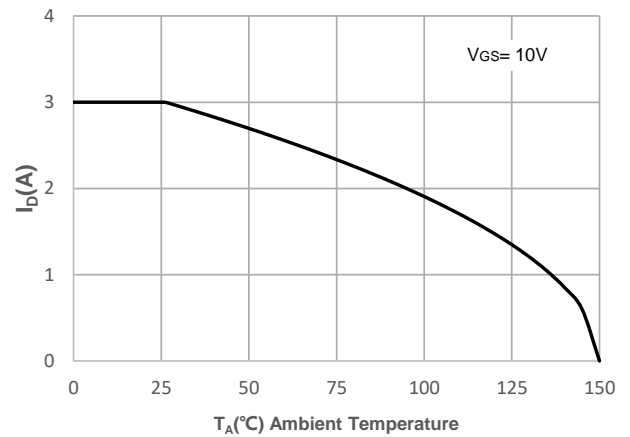


Figure 10: Maximum Continuous Driant Current vs. Ambient Temperature

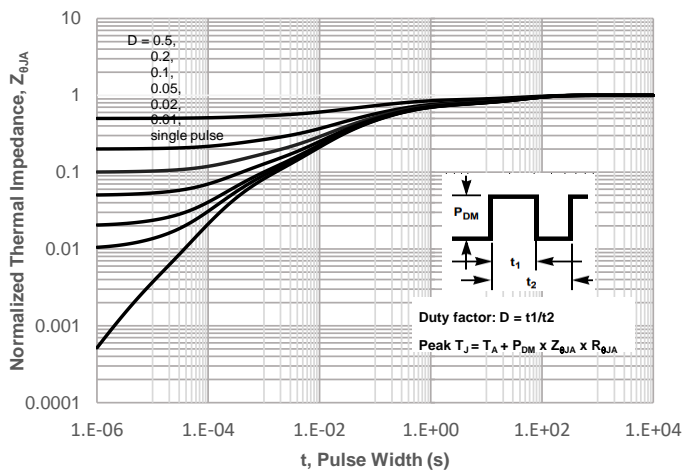


Figure 11: Normalized Maximum Transient Thermal Impedance

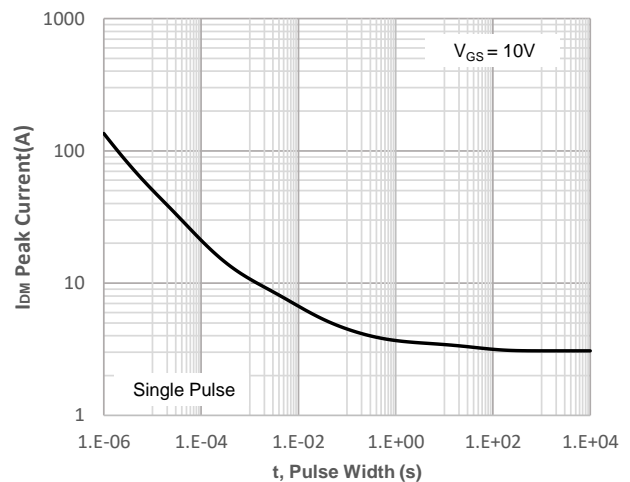


Figure 12: Peak Current Capacity

P-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-20	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-20V$	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-0.4	-0.6	-1	V
$R_{DS(on)}$	Drain-Source On Resistance ³	$V_{GS}=-4.5V, I_D=-2.5A$	---	90	120	$\text{m}\Omega$
		$V_{GS}=-2.5V, I_D=-1.5A$	---	120	150	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1\text{MHz}$	---	150	---	pF
C_{oss}	Output Capacitance		---	43	---	
C_{rss}	Reverse Transfer Capacitance		---	32	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, I_D=-2.5A$ $V_{GS}=-4.5V, R_{GEN}=3\ \Omega$	---	9.8	---	ns
t_r	Rise Time		---	5	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	21	---	ns
t_f	Fall Time		---	7	---	ns
Q_g	Total Gate Charge	$V_{GS}=-4.5V, V_{DS}=-10V,$ $I_D=-2.5A$	---	2.5	---	nC
Q_{gs}	Gate-Source Charge		---	0.45	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	0.75	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain to Source Diode	$V_D=V_G=0V$	---	---	-2	A
I_{SM}	Pulsed Drain to Source Diode		---	---	-8	---
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=-2.5A$	---	---	-1.2	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

P-Typical Characteristics: ($T_A=25^\circ C$ unless otherwise noted)

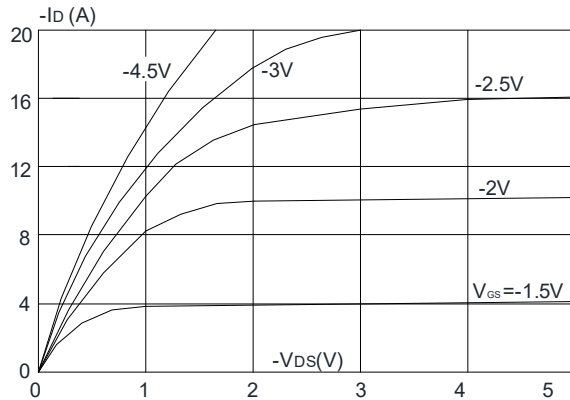


Figure 1: Output Characteristics

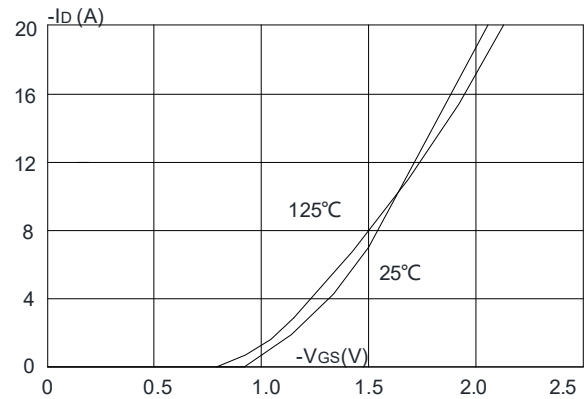


Figure 2: Typical Transfer Characteristics

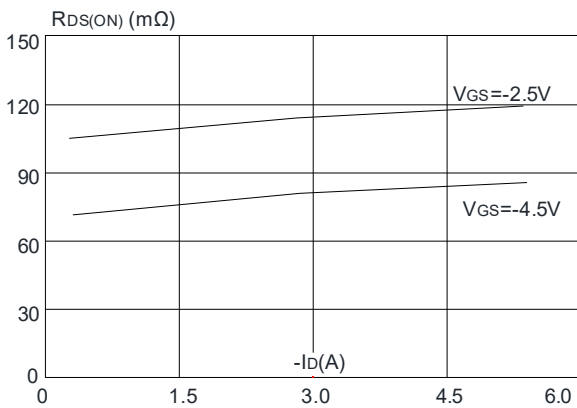


Figure 3: On-resistance vs. Drain Current

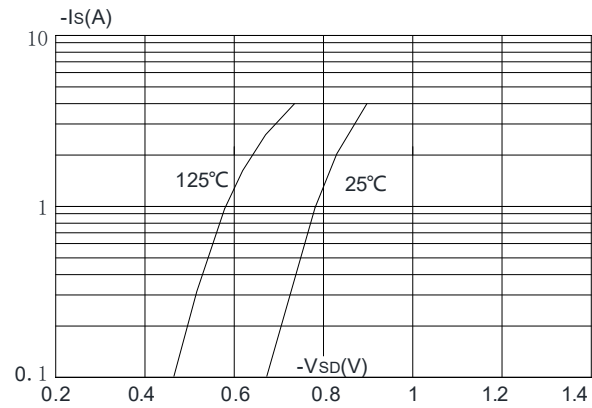


Figure 4: Body Diode Characteristics

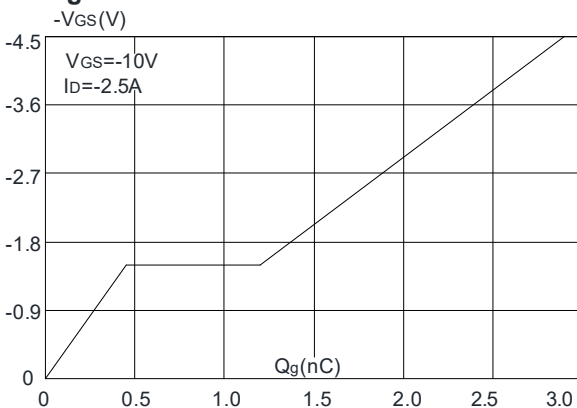


Figure 5: Gate Charge Characteristics

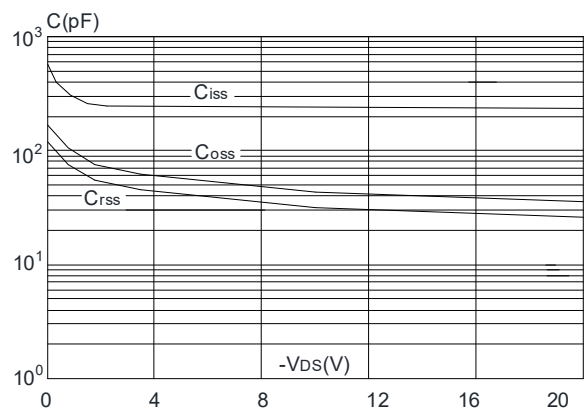


Figure 6: Capacitance Characteristics

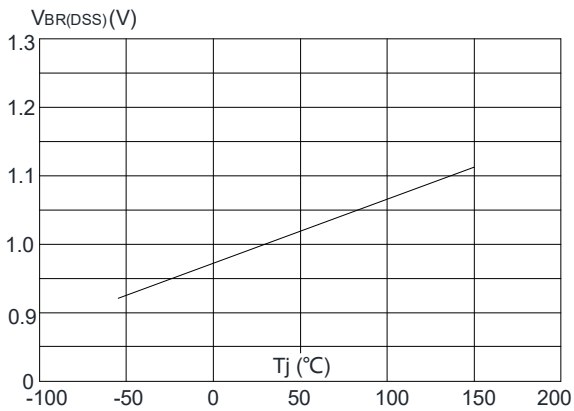


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

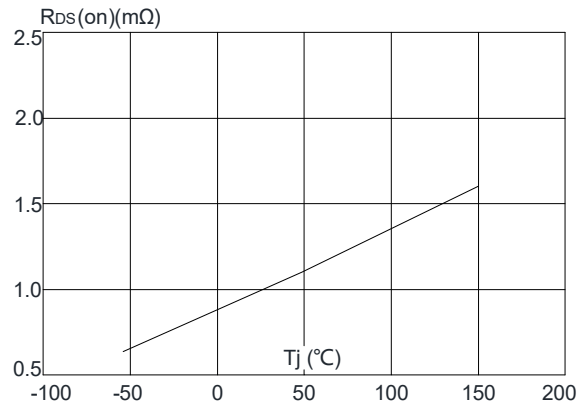


Figure 8: Normalized on Resistance vs. Junction Temperature

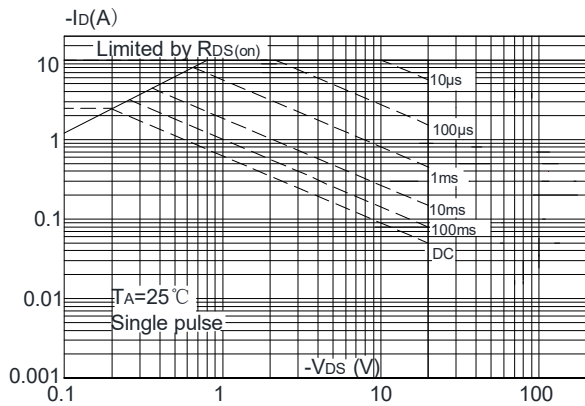


Figure 9: Maximum Safe Operating Area

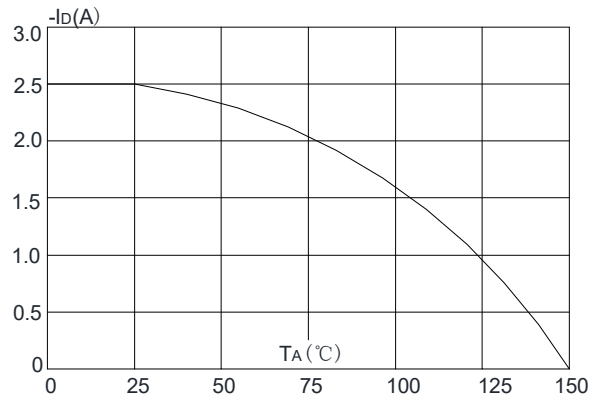


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

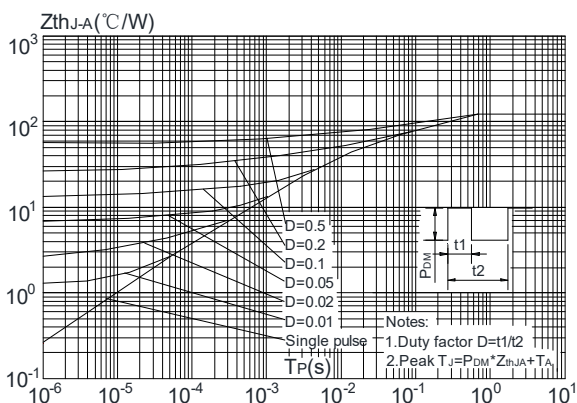
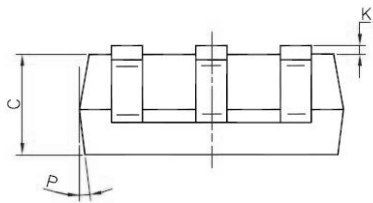
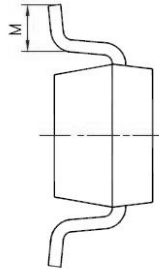
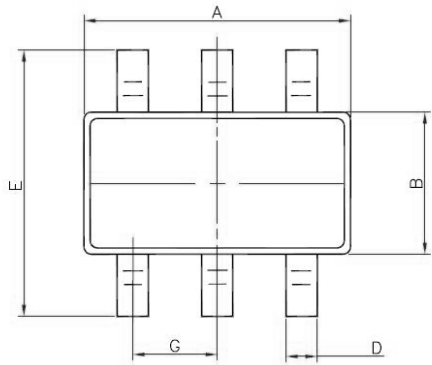


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

SOT-23-6 Package Outline Data

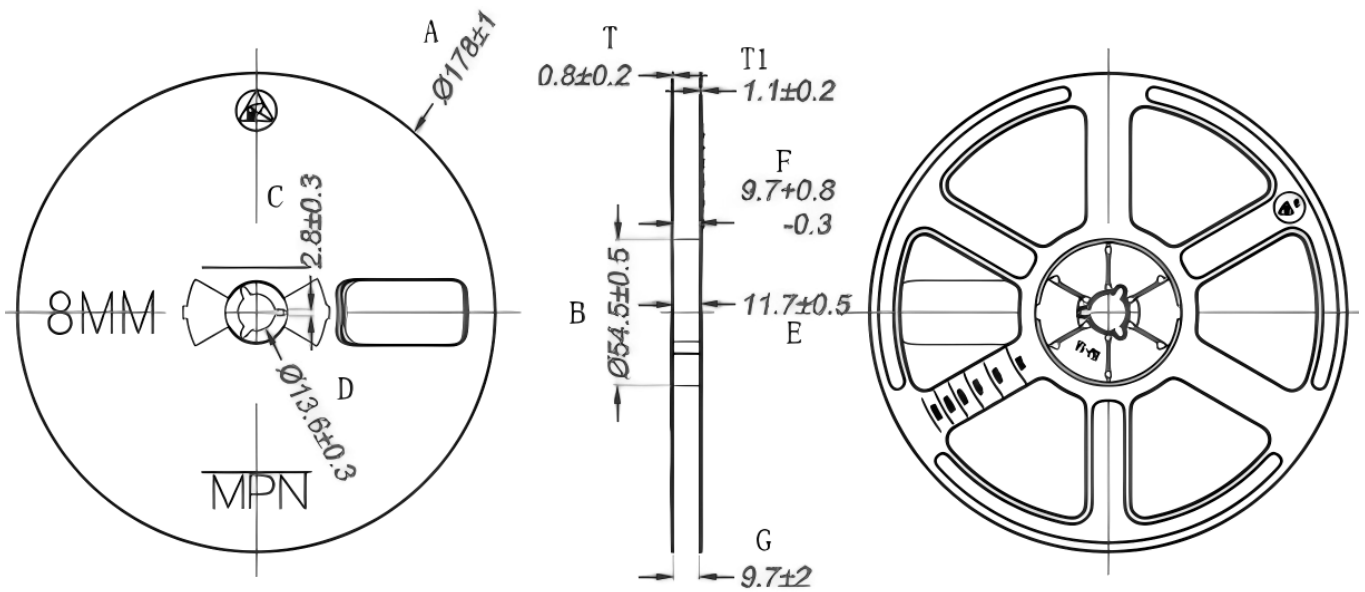


DIM	MILLIMETERS
A	2.82~3.02
B	1.60 ± 0.10
C	1.10 ± 0.05
D	0.40 ± 0.10
E	2.65~2.95
G	0.95typ
K	0.00~0.10
M	0.20MIN
P	9 ± 2°

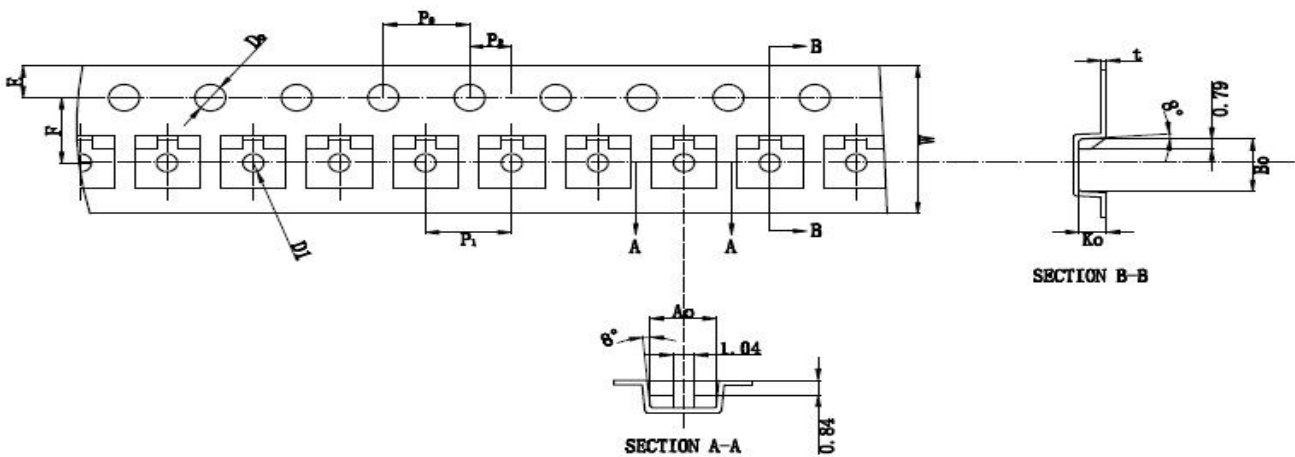
UNIT: mm

Tape & Reel Information

Dimensions in mm

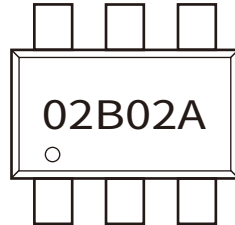


PKG TYPE	W	P	E	F	D	D1	Po	Po10	P2	A0	B0	K0	T
SOT23-6	8.00	4.00	1.75	3.50	1.50	1.00	4.00	40.00	2.00	3.13	3.22	1.30	0.20
Tolerance	±0.2	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.1	±0.1	±0.1	±0.1	±0.03



Pulling direction →

Marking Information:



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-03-18	Release of final version

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