

Description:

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

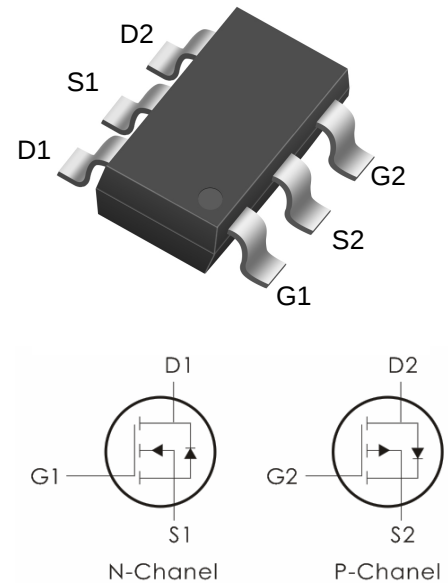
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=20V, I_D=7A, R_{DS(on)} < 20m\Omega @ V_{GS}=4.5V$ (Type: $15m\Omega$)

P-Channel: $V_{DS}=-20V, I_D=-6A, R_{DS(on)} < 28m\Omega @ V_{GS}=-4.5V$ (Type: $22m\Omega$)

- 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
DO4604A	4604A	SOT-23-6	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	± 10	± 12	V
I_D	Continuous Drain Current- $T_A=25^\circ C$	7	-6	A
	Continuous Drain Current- $T_A=100^\circ C$	4.6	-3.5	
I_{DM}	Pulsed Drain Current ¹	29	-20	A
P_D	Power Dissipation - $T_A=25^\circ C$	1.5	1.5	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	83	83	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	20	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =20V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 10V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	0.5	0.7	1	V
R _{DS(ON)}	Drain-Source On Resistance ³	V _{GS} =4.5V, I _D =4A	---	15	20	m Ω
		V _{GS} =2.5V, I _D =3A	---	18	23	m Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	750	---	pF
C _{oss}	Output Capacitance		---	135	---	
C _{rss}	Reverse Transfer Capacitance		---	75	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =10V, I _D =3.5A, R _{ENG} =3 Ω ,V _{GS} =4.5V	---	9	---	ns
t _r	Rise Time		---	30	---	ns
t _{d(off)}	Turn-Off Delay Time		---	35	---	ns
t _f	Fall Time		---	10	---	ns
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =3.5A	---	11	---	nc
Q _{gs}	Gate-Source Charge		---	2.3	---	nc
Q _{gd}	Gate-Drain “Miller” Charge		---	2.9	---	nc
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =6.8A	---	---	1.2	V
I _S	Continuous Drain Curren	V _D =V _G =0V	---	---	7	A
I _{SM}	Pulsed Drain Current		---	---	29	A

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$

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

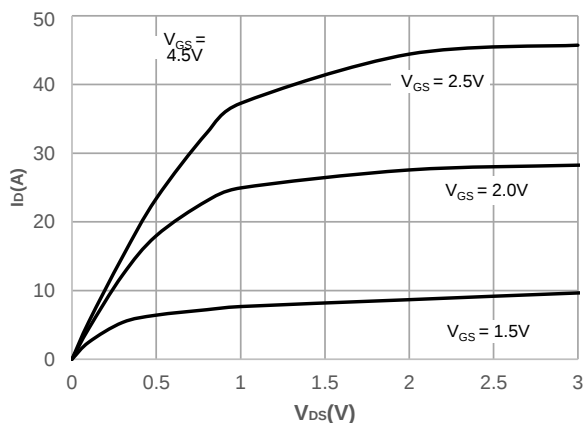


Figure 1: Output Characteristics

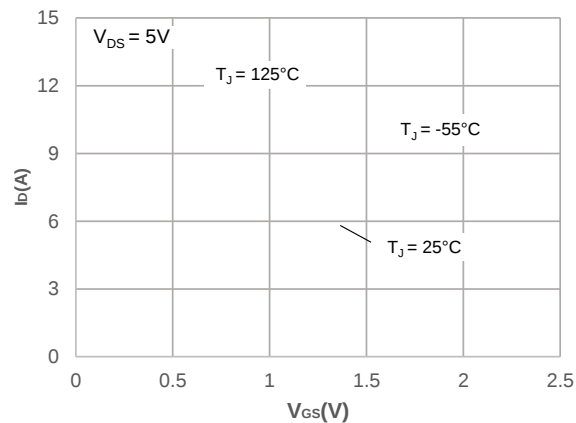


Figure 2: Typical Transfer Characteristics

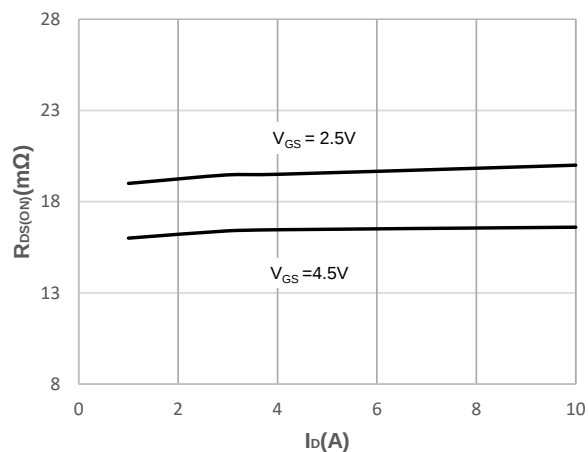


Figure 3: On-resistance vs. Drain Current

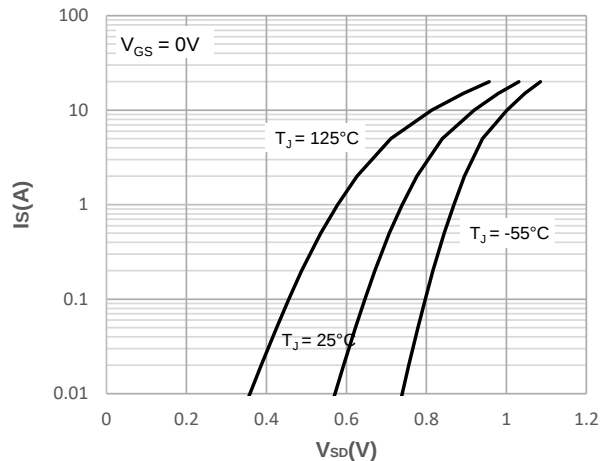


Figure 4: Body Diode Characteristics

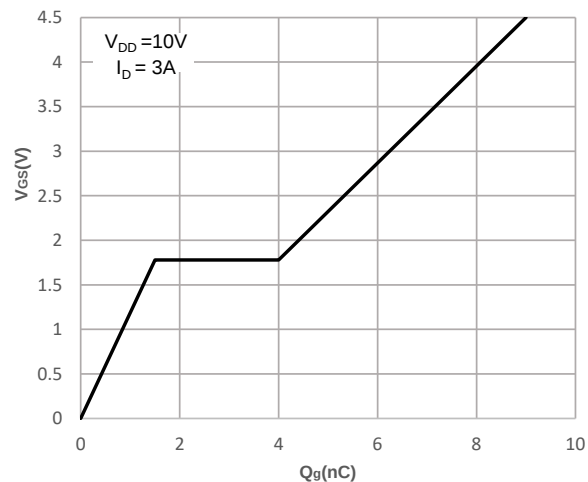


Figure 5: Gate Charge Characteristics

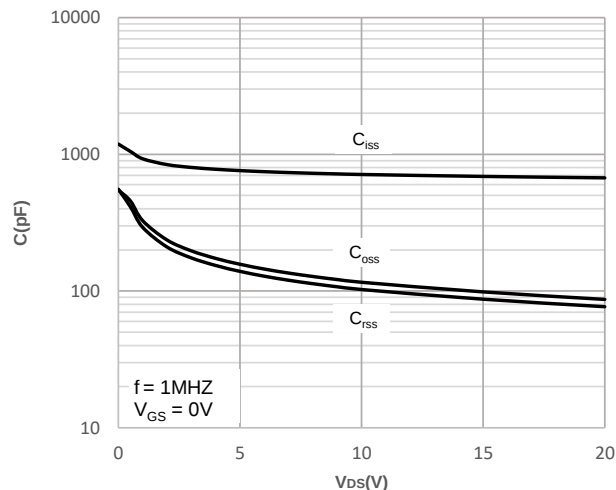


Figure 6: Capacitance Characteristics

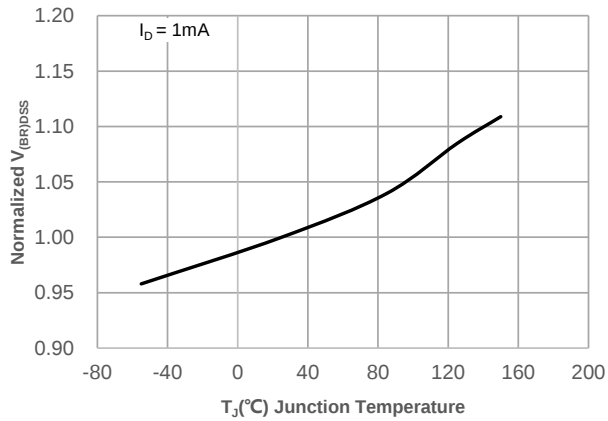


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

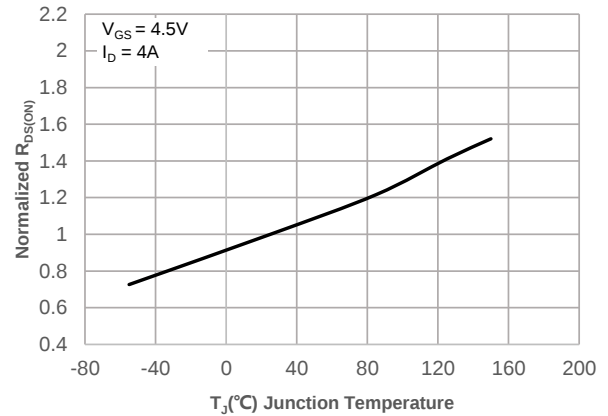


Figure 8: Normalized on Resistance vs. Junction Temperature

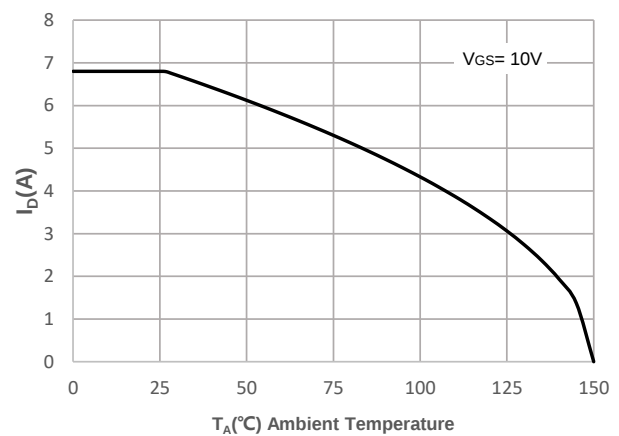
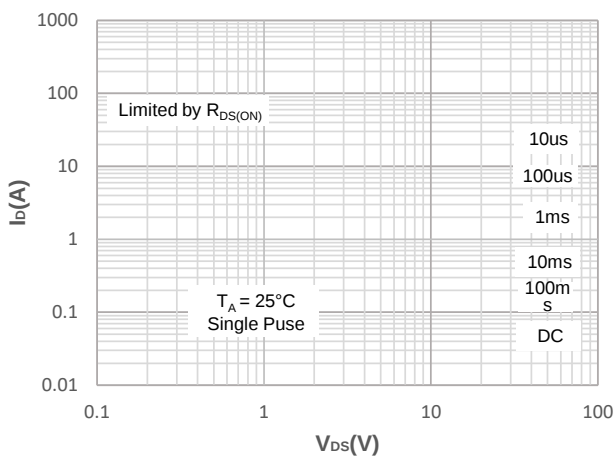


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

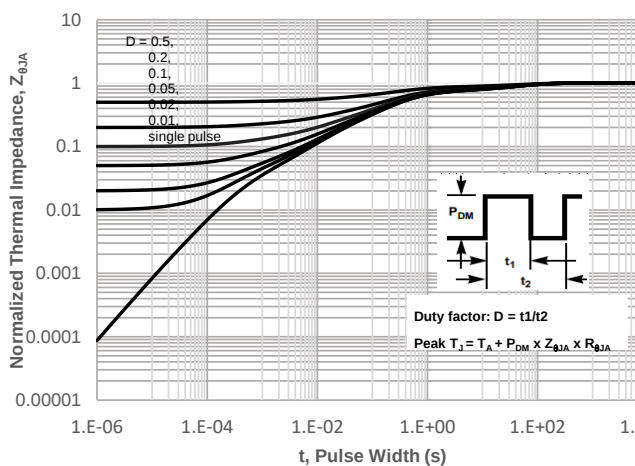


Figure 11: Normalized Maximum Transient Thermal Impedance

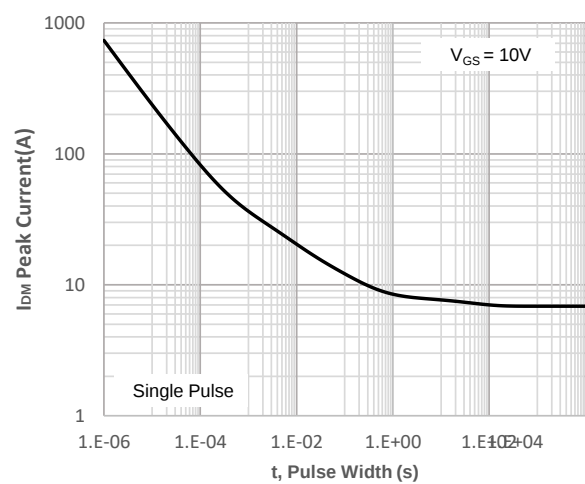


Figure 12: Peak Current Capacity

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 μ A	-20	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-20V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 12V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	-0.5	---	-1	V
R _{DS(ON)}	Drain-Source On Resistance ²	V _{GS} =-4.5V, I _D =-4A	---	22	28	m Ω
		V _{GS} =-2.5V, I _D =-4A	---	28	36	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	980	---	pF
C _{oss}	Output Capacitance		---	160	---	
C _{rss}	Reverse Transfer Capacitance		---	70	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -10V, I _D =-3.7A V _{GS} = -4.5V, R _{GEN} =1 Ω	---	712	---	ns
t _r	Rise Time		---	1386	---	ns
t _{d(off)}	Turn-Off Delay Time		---	9.1	---	ns
t _f	Fall Time		---	4	---	ns
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-4.5V, I _D =-4A	---	11.1	---	nC
Q _{gs}	Gate-Source Charge		---	3.1	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	2.4	---	nC
Drain-Source Diode Characteristics						
I _S	Continuous Drain to Source Diode	V _D =V _G =0V	---	---	-6	A
I _{SM}	Pulsed Drain to Source Diode		---	---	-20	---
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V, I _S =-1A	---	-0.67	-1.2	V

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

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

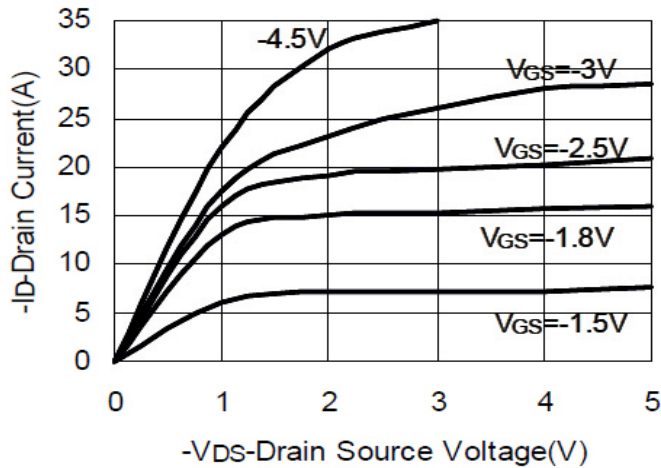


Figure1: Output Characteristics

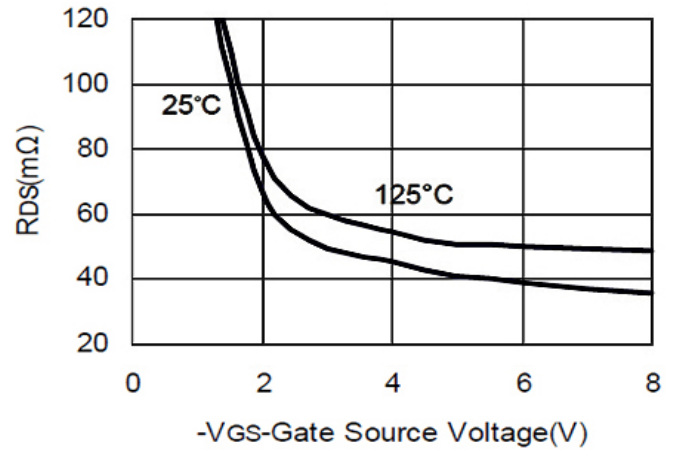


Figure 2: Drain-Source On Resistance

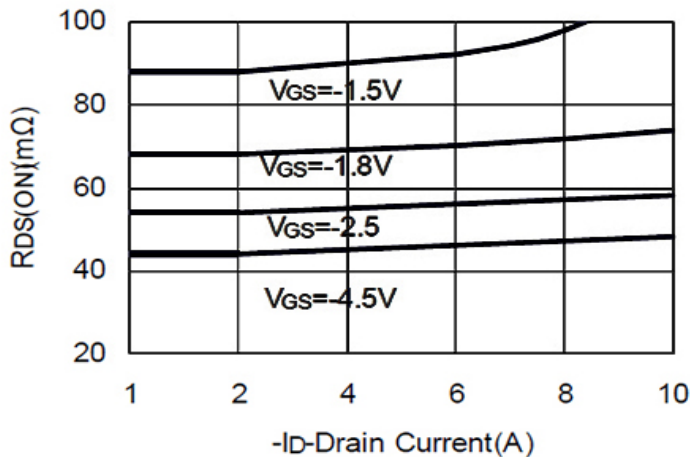


Figure 3: Drain Source On Resistance

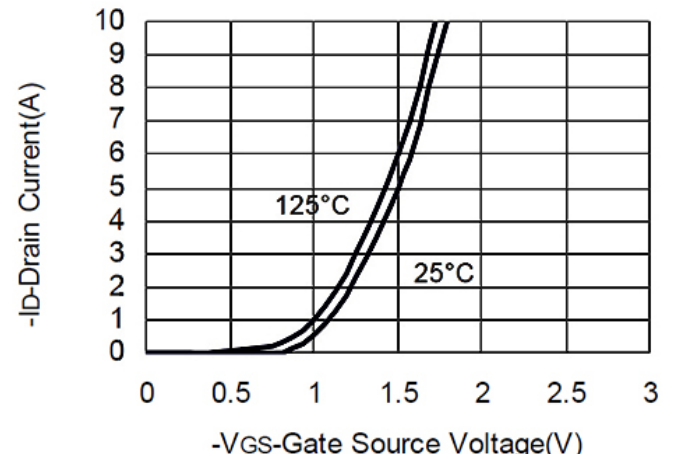


Figure 4: Transfer Characteristics

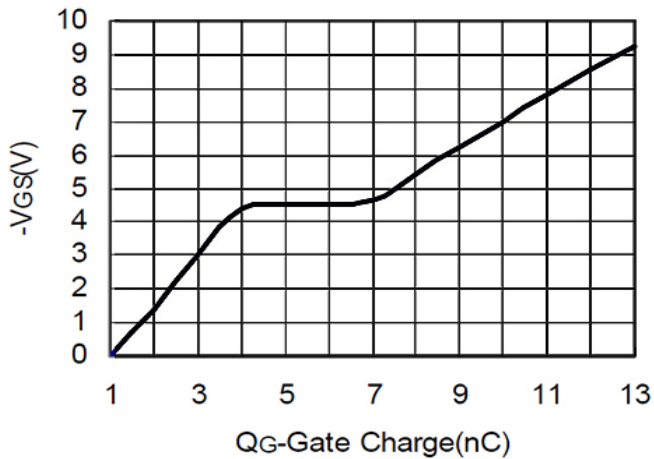


Figure 5 Gate Charge

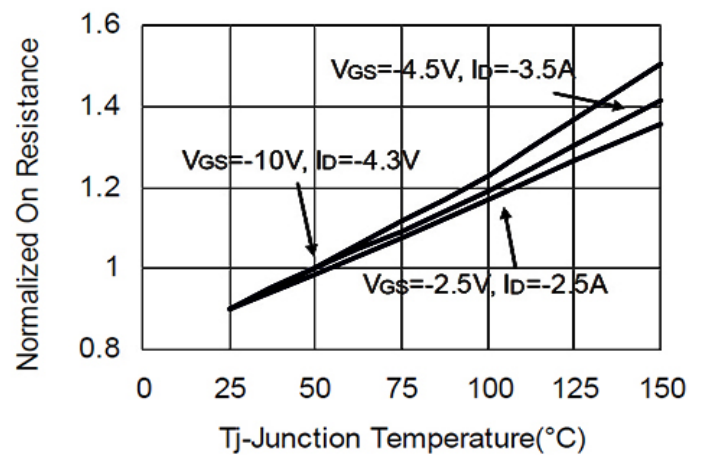


Figure 6: Drain Source Resistance

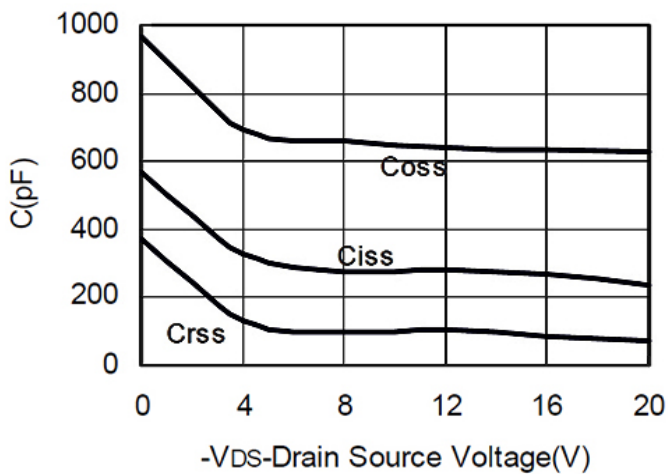


Figure 7: Capacitance

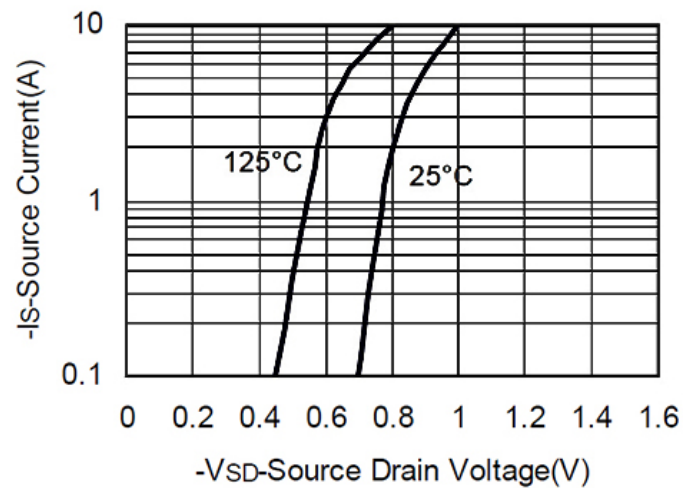


Figure 8: Source Drain Diode Forward

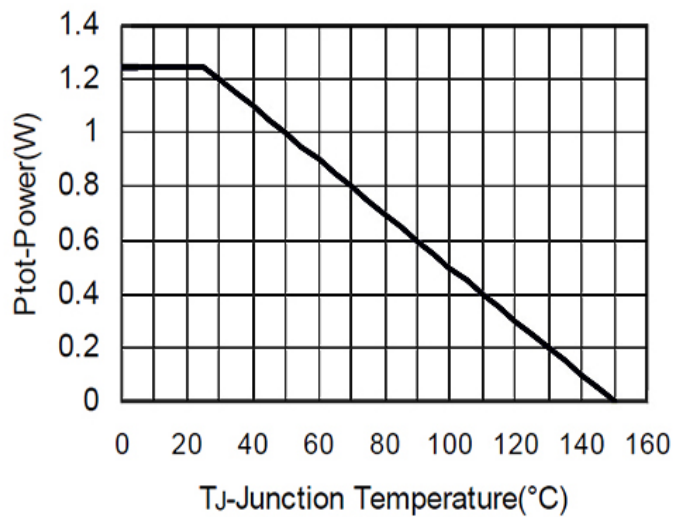


Figure 9: Power Dissipation

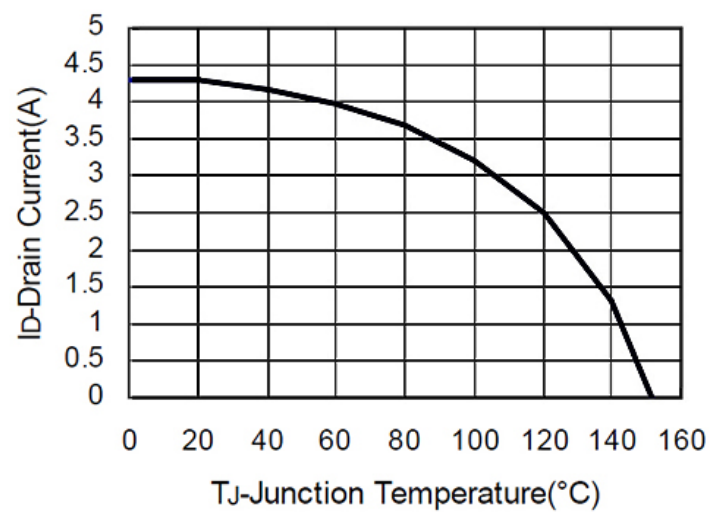


Figure 10: Drain Current

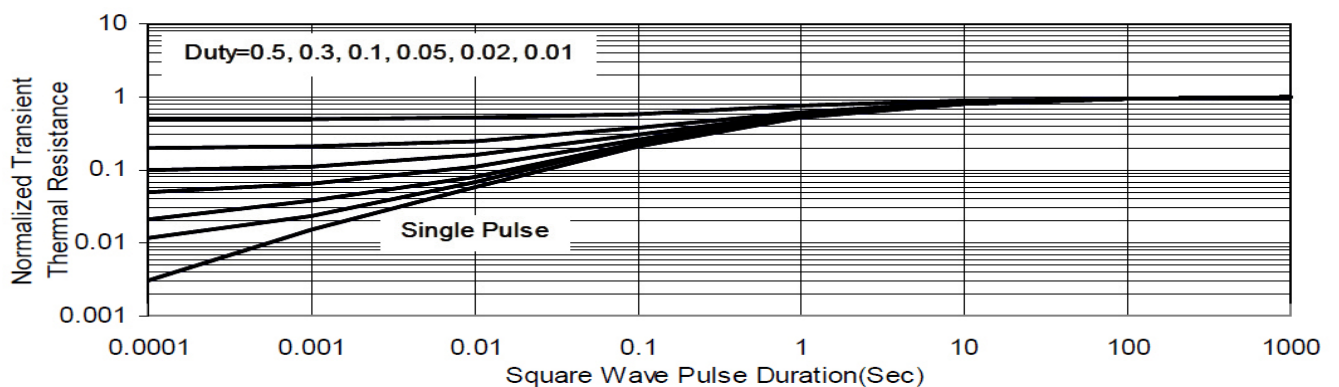
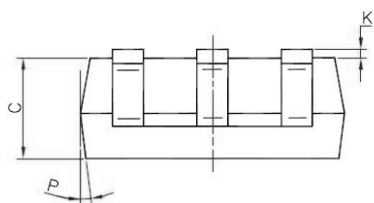
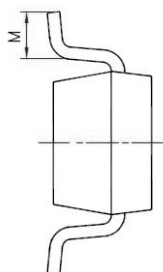
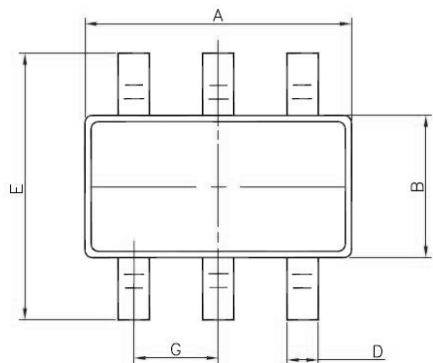


Figure.11: Thermal Transient Impedance

SOT-23-6 Package Outline Data

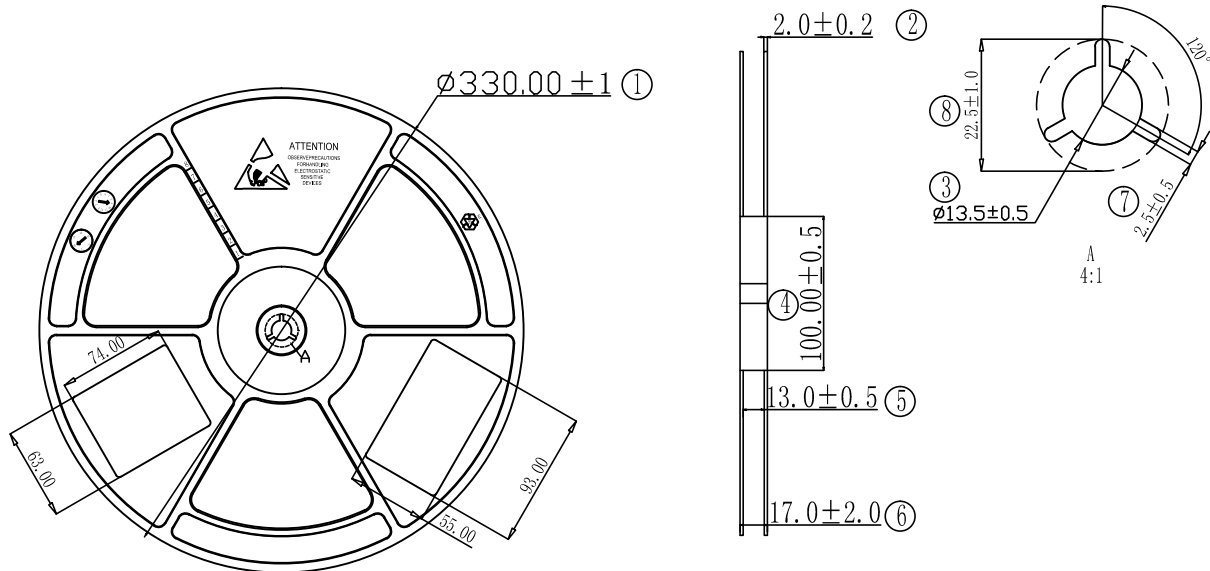


DIM	MILLIMETERS
A	2.82~3.02
B	1.60 ± 0.10
C	1.10 ± 0.05
D	0.40 ± 0.10
E	2.65~2.95
G	0.95typ
K	0.00~0.10
M	0.20MIN
P	9 ± 2°

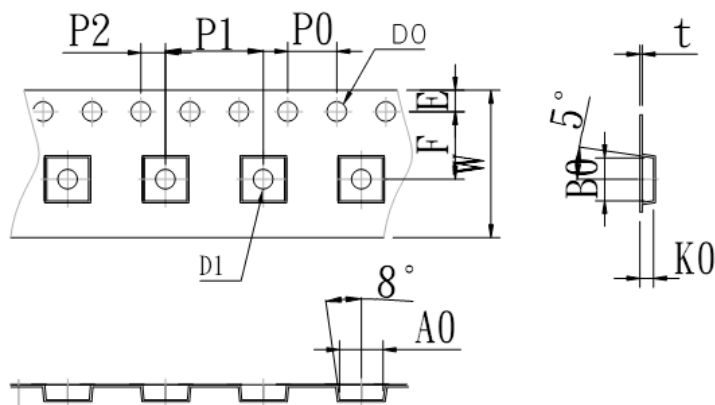
UNIT: mm

Tape & Reel Information

Dimensions in mm

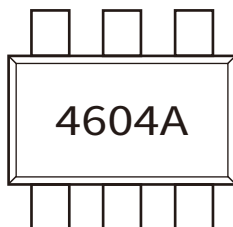


Symbol	A0	B0	K0	D0	D1	P0	P1	10*P0
Spec	3.55±0.10	3.45±0.10	1.13±0.10	1.55±0.10	1.55±0.10	4.00±0.10	8.00±0.10	40.0±0.10
Symbol	W	E	F	P2	t			
Spec	12.00±0.10	1.75±0.10	5.50±0.10	2.00±0.10	0.20±0.05			



Pulling direction →

Marking Information:



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2024-10-02	Release of final version

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