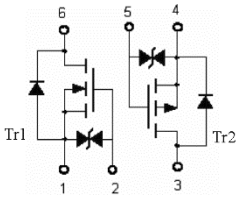
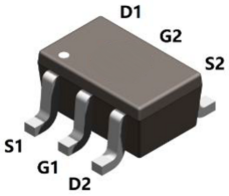
2N7172DW

N+P Channel Enhancement Mode MOSFET

Features

- Low on-resistance
- ESD protected
- High speed switching
- Low leakage current
- JESD22-A114-B ESD rating of class 2 per human body model





SOT-363

Mechanical Data

- Case: SOT-363
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
2N7172DW	SOT-363	3000 pcs / Tape & Reel	7172

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Q1	Q2	Unit
Drain-to-Source Voltage	V_{DSS}	60	-60	V
Gate-to-Source Voltage	V_{GSS}	±20	±20	V
Continuous Drain Current (T_A = 25°C) *2	I_D	0.3	-0.2	A
Continuous Drain Current (T_A = 70°C) *2		0.24	-0.16	A
Pulsed Drain Current (t_p = 10μs, T_A = 25°C)	I_{DM}	1.2	-0.8	A
Single Pulse Avalanche Energy *5	E_{AS}	0.2	0.3	mJ
Power Dissipation (T_A = 25°C) *1	P_D	0.2		W
Power Dissipation (T_A = 25°C) *2		0.3		W
Operating Junction Temperature Range	T_J	-55 ~ +150		°C
Storage Temperature Range	T_{STG}	-55 ~ +150		°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	625	°C/W
Thermal Resistance Junction-to-Air *2		-	-	420	°C/W

Electrical Characteristics-Q_1 (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *3	V_{GS} = 10V,I_D = 0.5A	-	1.4	2.5	Ω
		V_{GS} = 4.5V,I_D = 0.5A	-	1.8	4	Ω
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1	1.5	2.5	V
Dynamic Characteristics						
g_{fs}	Transconductance	V_{DS} = 10V, I_D = 0.2A	-	0.5	-	S
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 20V f = 1.0MHz	-	34.5	-	pF
C_{OSS}	Output Capacitance		-	11.5	-	
C_{RSS}	Reverse Transfer Capacitance		-	1.5	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} = 30V, V_{GS} = 10V R_L = 150Ω R_G = 25Ω I_D = 0.2A	-	6	-	nS
t_r	Turn-on Rise Time *4		-	5	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	25	-	
t_f	Turn-Off Fall Time *4		-	15	-	
Q_G	Total Gate-Charge	V_{DS} = 10V V_{GS} = 4.5V I_D = 0.2A	-	0.44	-	nC
Q_{GS}	Gate to Source Charge		-	0.14	-	nC
Q_{GD}	Gate to Drain (Miller) Charge		-	0.2	-	nC
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *3	I_{SD} = 0.3A, V_{GS} = 0V	-	0.86	1.2	V

Electrical Characteristics-Q_2 (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250μA	-60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -60V, V_{GS} = 0V	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *3	V_{GS} = -10V, I_D = -0.1A	-	1.8	4	Ω
		V_{GS} = -4.5V, I_D = -0.1A	-	2.3	5	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1	-1.5	-2	V
Dynamic Characteristics						
g_{fs}	Transconductance	V_{DS} = -10V, I_D = -0.2A	-	0.5	-	S
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = -20V f = 1.0MHz	-	39	-	pF
C_{OSS}	Output Capacitance		-	12	-	
C_{RSS}	Reverse Transfer Capacitance		-	2	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DS} = -15V R_L = -50Ω I_D = -2.5A	-	2.5	-	ns
t_r	Turn-on Rise Time *4		-	1	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	16	-	
t_f	Turn-Off Fall Time *4		-	8	-	
Q_G	Total Gate-Charge	V_{DS} = -25V V_{GS} = -4.5V I_D = -0.2A	-	2	-	nC
Q_{GS}	Gate to Source Charge		-	0.7	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.5	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *3	I_S = -0.2A, V_{GS} = 0 V	-	-0.87	-1.4	V

Notes:

1. The data tested by surface mounted on a minimum recommended pad
2. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper
3. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
4. Guaranteed by design, not subject to production
5. The E_{AS} data shows Max. rating. N: The test condition is V_{DD} = 30V, V_{GS} = 10V, L = 0.1mH;
   P: The test condition is V_{DD} = -30V, V_{GS} = -10V, L = 0.1mH

Ratings and Characteristics Curves-Q_1 (@ T_A = 25°C unless otherwise specified)

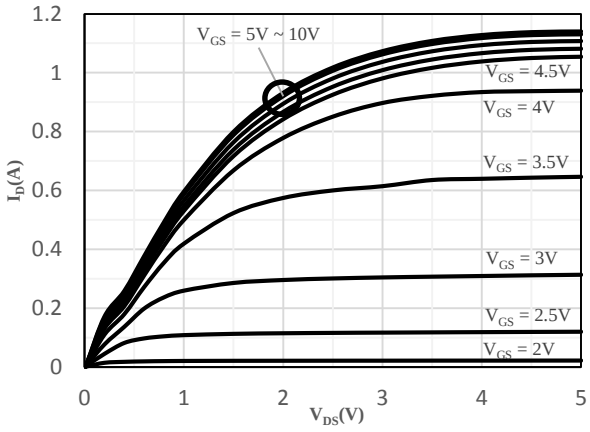


Fig 1 Typical Output Characteristics

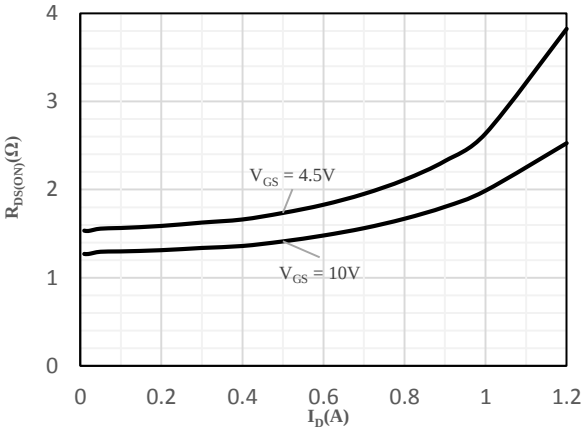


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

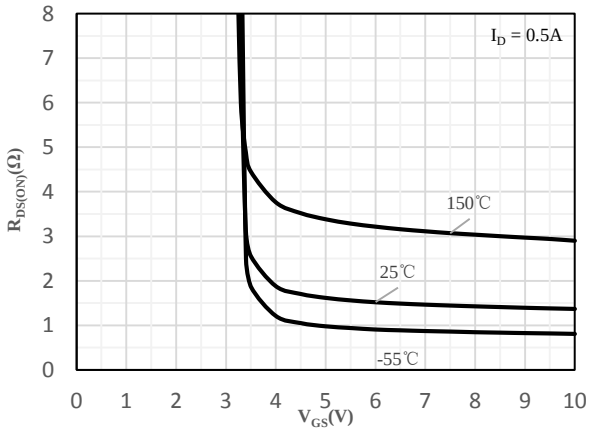


Fig 3 On-Resistance vs. Gate-Source Voltage

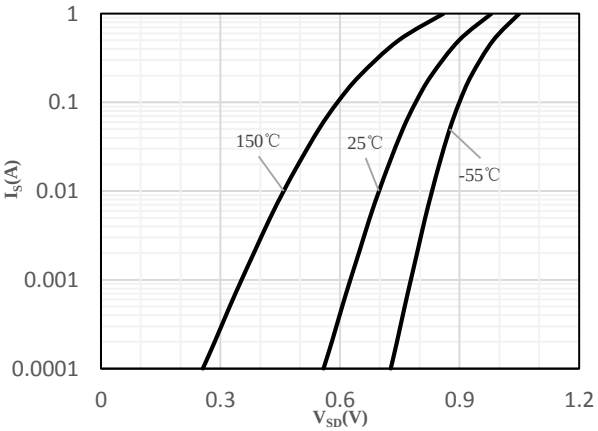


Fig 4 Body-Diode Characteristics

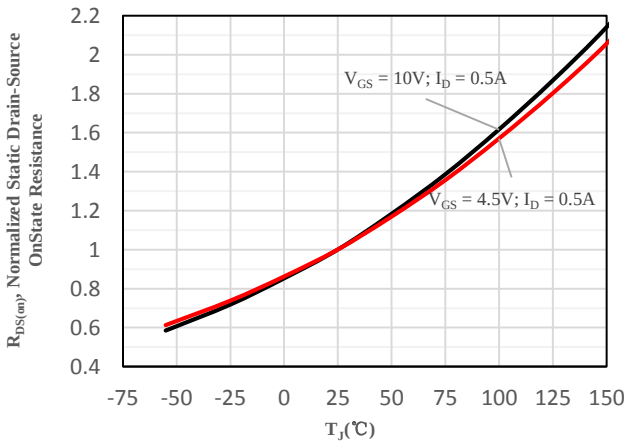


Fig 5 Normalized On-Resistance vs. Junction Temperature

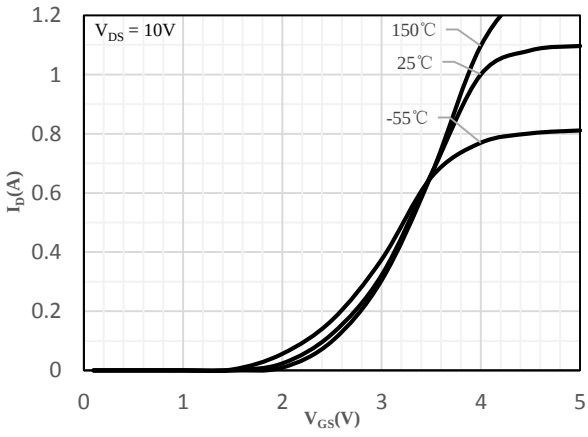


Fig 6 Transfer Characteristics

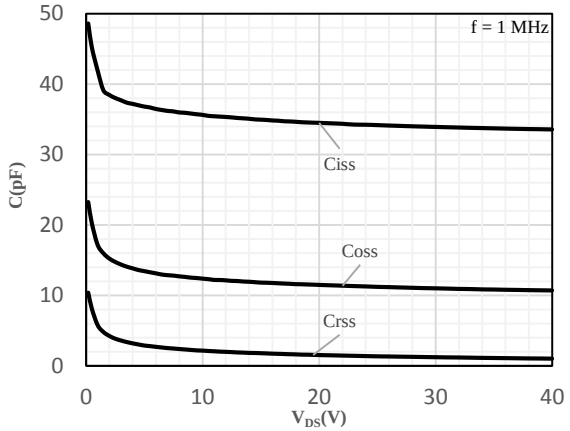


Fig 7 Capacitance Characteristics

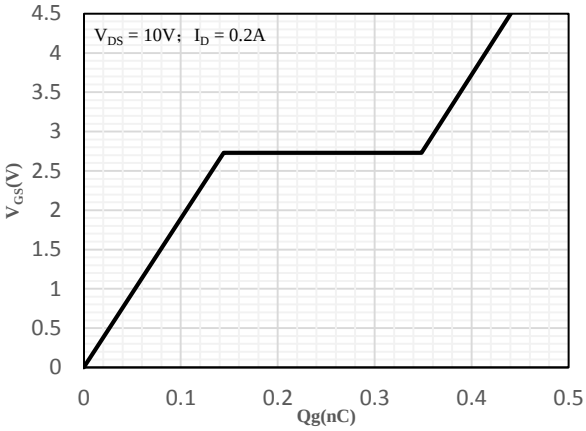


Fig 8 Gate-Charge Characteristics

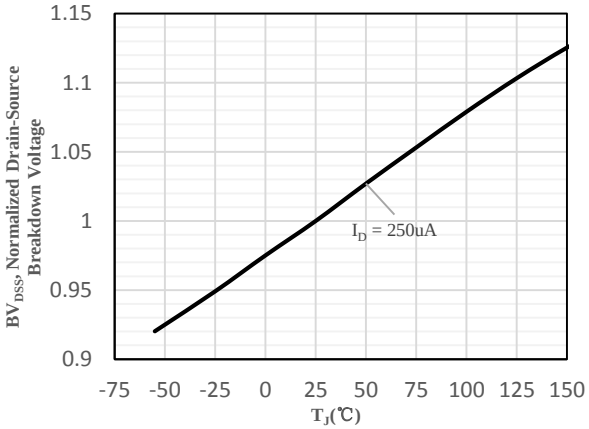


Fig 9 Normalized Breakdown Voltage vs. Junction Temperature

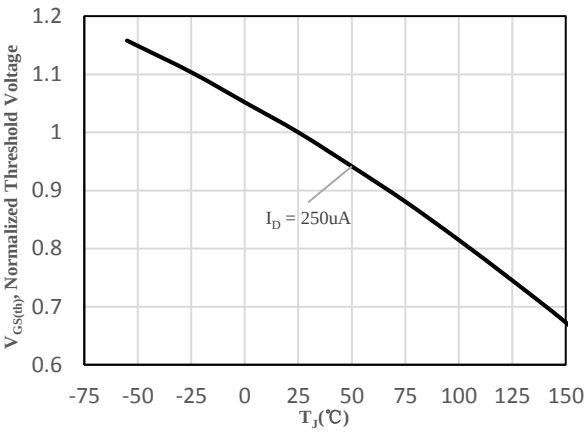


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

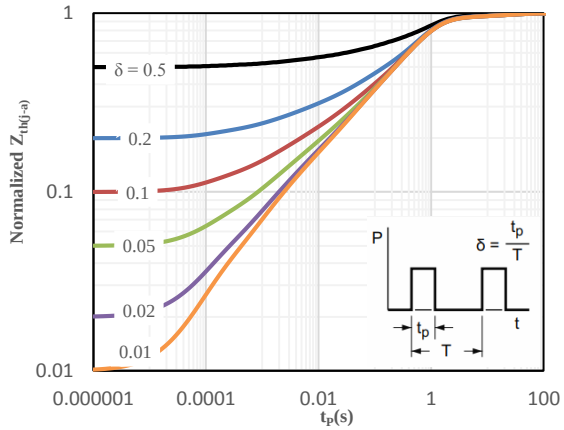


Fig 11 Normalized Maximum transient thermal impedance

Ratings and Characteristics Curves-Q_2 (@ T_A = 25°C unless otherwise specified)

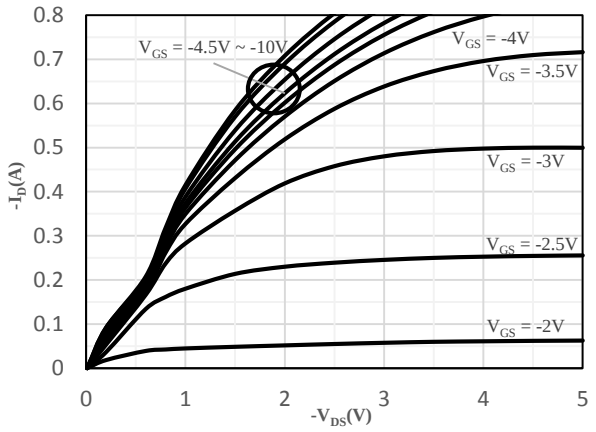


Fig 1 Typical Output Characteristics

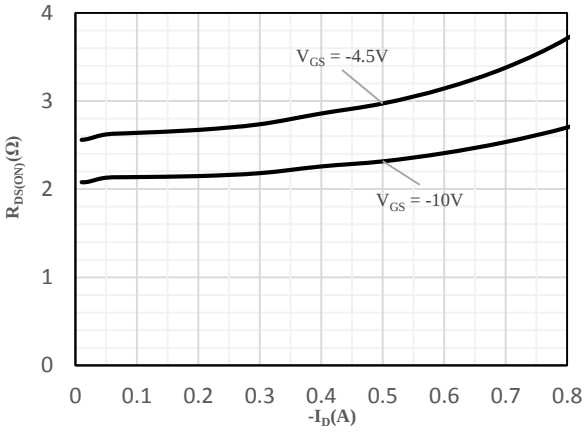


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

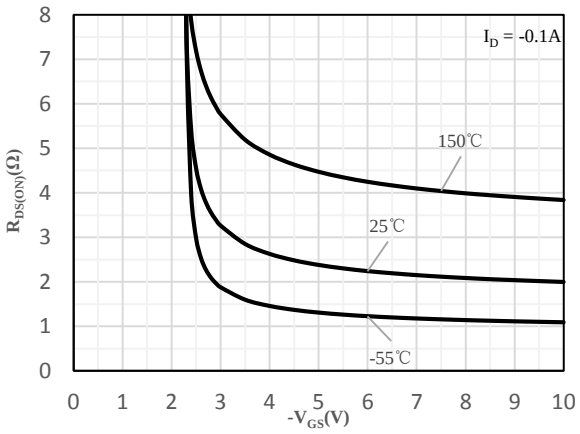


Fig 3 On-Resistance vs. Gate-Source Voltage

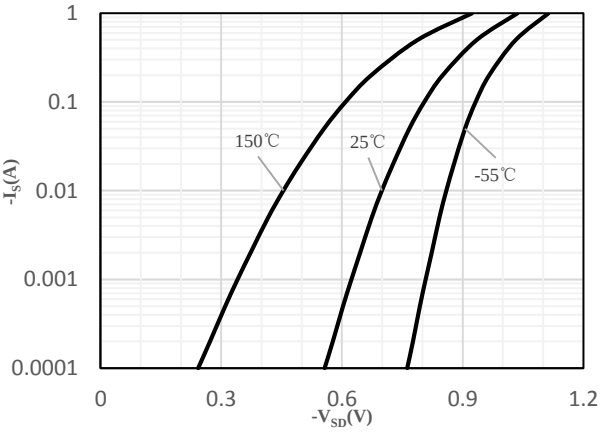


Fig 4 Body-Diode Characteristics

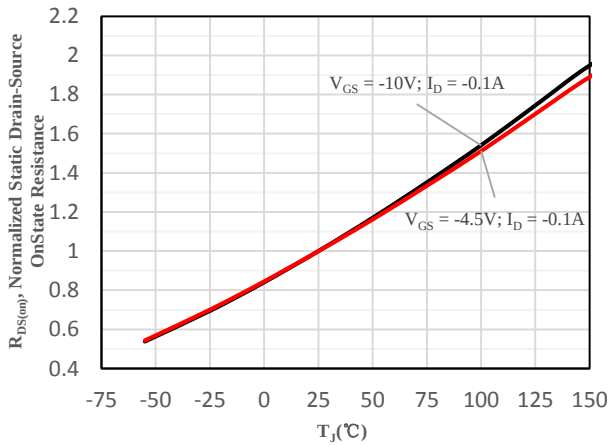


Fig 5 Normalized On-Resistance vs. Junction Temperature

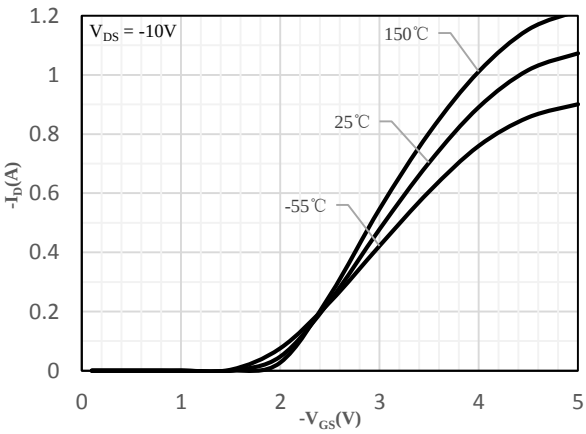


Fig 6 Transfer Characteristics

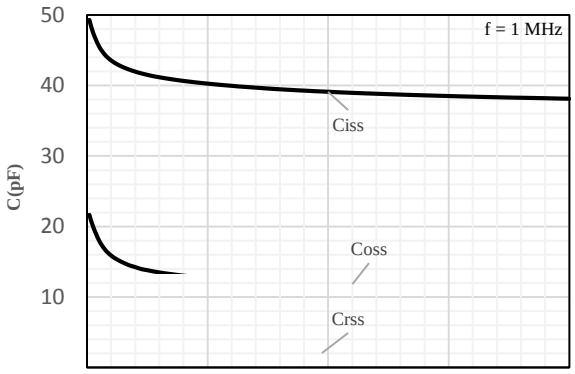


Fig 7 Capacitance Characteristics

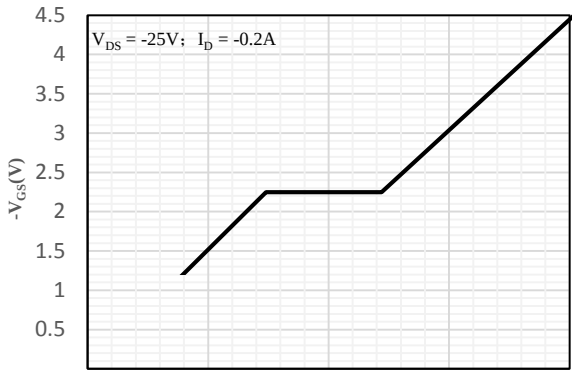


Fig 8 Gate-Charge Characteristics

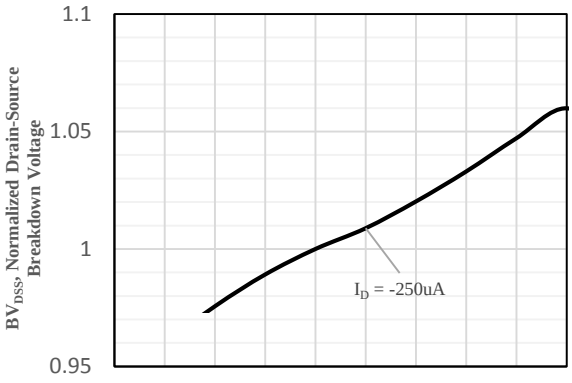


Fig 9 Normalized Breakdown Voltage vs. Junction Temperature

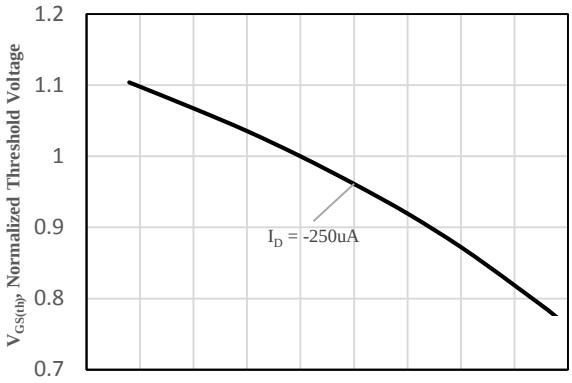


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

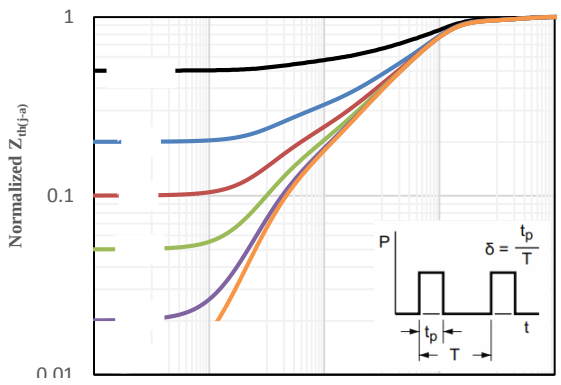
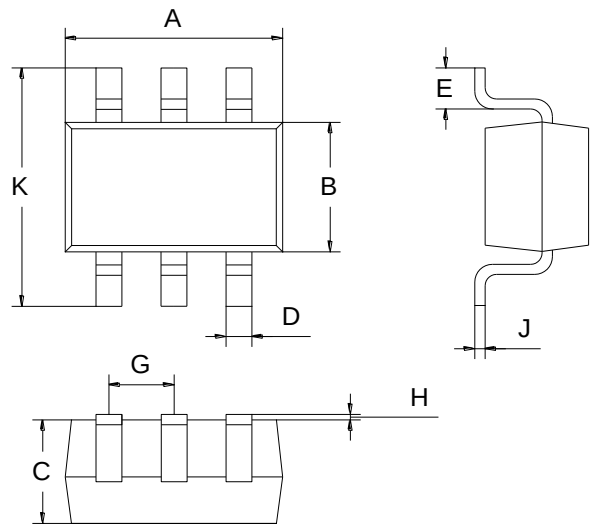


Fig 11 Normalized Maximum transient thermal

Package Outline Dimensions (Unit: mm)



SOT-363		
Dimension	**Min.**	**Max.**
A	2.00	2.20
B	1.15	1.35
C	0.85	1.05
D	0.15	0.35
E	0.25	0.40
G	0.60	0.70
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

Mounting Pad Layout (Unit: mm)

SOT-363