$V_{(BR)DSS}$ = 300 V, $R_{DS(ON)}$ = 0.15 Ω
N-channel Power MOSFET

SUK3015

Data Sheet

Description

SUK3015 includes a low on-resistance N-channel power MOSFET with Zener diode for ESD protection. The package of SUK3015 is TO220S-2L that is surface mount package and high heat release.

Features

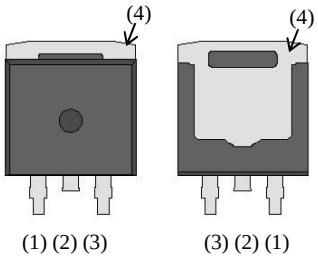
- Suitable for High Reliability and Automotive Requirement
- Bare Lead Frame: Pb-free (RoHS Compliant)
- Low On-resistance
- Gate-to-Source ESD Protection Zener Diode
- 100% Avalanche Tested
- $V_{(BR)DSS}$ ---------- 300 V (I_D = 100 μA)
- I_D ---------- ±15 A
- $R_{DS(ON)}$ ---------- 0.15 Ω max. (I_D = 7 A, V_{GS} =10 V)
- t_{rr} ---------- 160 ns (typ.)

Applications

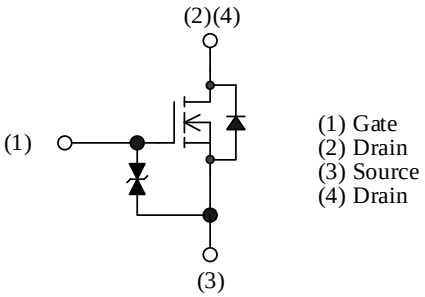
- DC/DC Converter
- Other Switched-mode Power Supply

Package

TO220S-2L



Not to scale



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Absolute Maximum Ratings

Unless otherwise specified, T_A = 25 °C.

Parameter	Symbol	Conditions	Rating	Unit
Drain-to-Source Voltage	V_{DS}		300	V
Gate-to-Source Voltage	V_{GS}		±25	V
Continuous Drain Current	I_D		±15	A
Pulsed Drain Current	I_{DM}	Pulse width ≤ 100 µs, duty cycle ≤ 1 %	±60	A
Avalanche Energy	E_{AS}	V_{DD} = 49 V, L = 120 µH, I_{AS} =26.7 A, V_{GS} = 16 V, R_G = 0 Ω, unclamped; see Figure 1.	50	mJ
Avalanche Current	I_{AS}		26.7	A
Power Dissipation	P_D	T_C = 25 °C	89	W
Maximum Drain-to-Source dv/dt 1	dv/dt1	V_{DD} = 49 V, L = 120 µH, I_{AS} =26.7 A, V_{GS} = 16 V, R_G = 0 Ω, unclamped; see Figure 1.	3.0	V/ns
Maximum Diode Recovery dv/dt 2	dv/dt2	V_{DD} = 200 V, L = 0.2 mH, I_{SDP} = 15 A; see Figure 2.	8.5	V/ns
Maximum Diode Recovery di/dt	di/dt	V_{DD} = 200 V, L = 0.2 mH, I_{SDP} = 15 A; see Figure 2.	190	A/µs
Operating Junction Temperature	T_J		150	°C
Storage Temperature	T_{STG}		−55 to 150	°C

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Electrical Characteristics

Unless otherwise specified, T_A = 25 °C.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 100 µA, V_{GS} = 0 V	300	—	—	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS} = 300 V, V_{GS} = 0 V	—	—	100	µA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS} = ±20 V	—	—	10	µA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = 10 V, I_D = 1 mA	1.5	2.0	2.5	V
Static Drain-to-Source On-resistance	$R_{DS(ON)}$	I_D = 7 A, V_{GS} = 10 V	—	—	0.15	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	1800	—	pF
Output Capacitance	C_{oss}		—	420	—	
Reverse Transfer Capacitance	C_{rss}		—	85	—	
Turn-on Delay Time	$t_{d(ON)}$	V_{DD} = 200 V, I_D = 7 A, V_{GS} = 10 V, R_G = 15.6 Ω, R_L = 28.6 Ω; see Figure 3.	—	15	—	ns
Turn-on Rise Time	t_r		—	34	—	
Turn-off Delay Time	$t_{d(OFF)}$		—	112	—	
Turn-off Fall Time	t_f		—	144	—	
Source-to-Drain Diode Forward Voltage	V_{SD}	I_{SD} = 7 A, V_{GS} = 0 V	—	—	1.2	V
Source-to-Drain Diode Reverse Recovery Time	t_{rr}	I_{SDP} = 15 A, di/dt = 100 A/µs; see Figure 2.	—	160	—	ns

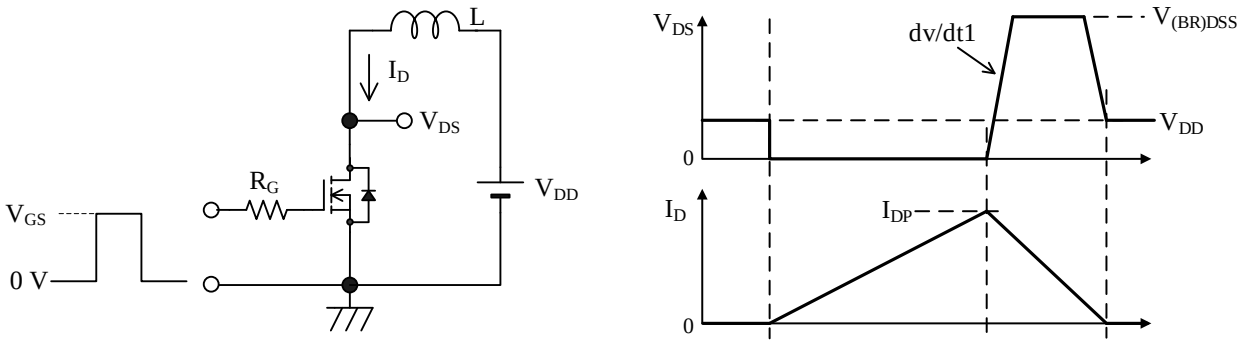
Thermal Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal Resistance (Junction-to-Case)	$R_{\theta JC}$		—	—	1.4	°C/W

Mechanical Characteristics

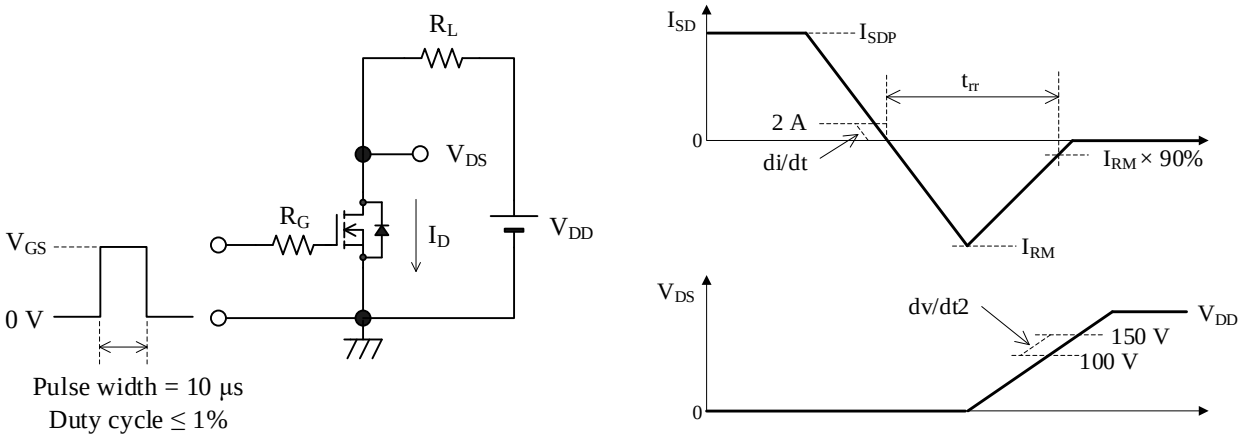
Parameter	Conditions	Min.	Typ.	Max.	Unit
Package Weight		—	1.4	—	g

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(a) Test Circuit (b) Waveform

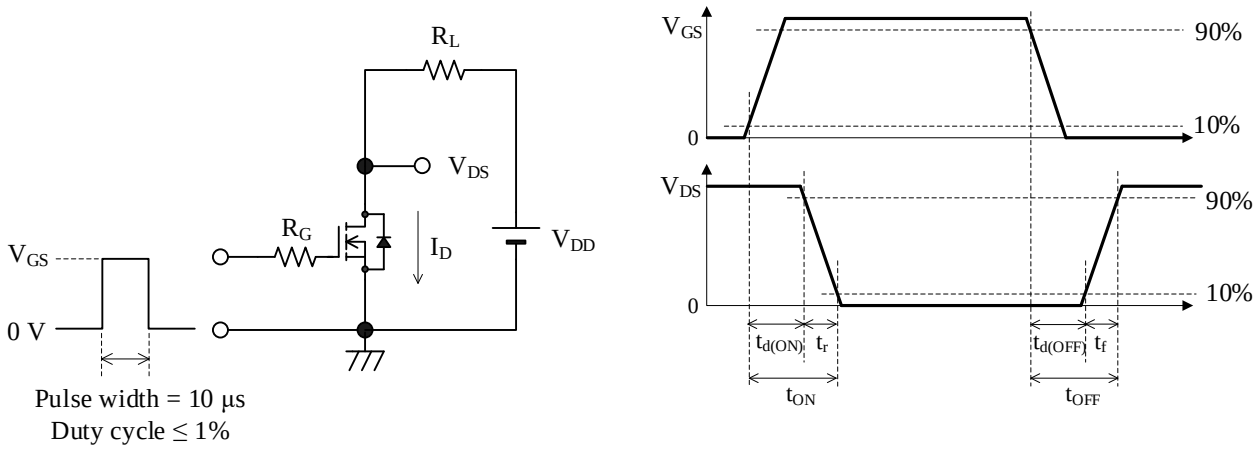
Figure 1. Unclamped Inductive Switching Energy Test



(a) Test Circuit (b) Waveform

Figure 2. Diode Reverse Recovery Time Test

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(a) Test Circuit (b) Waveform

Figure 3. Resistive Load Switching Time Test

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Derating Curve

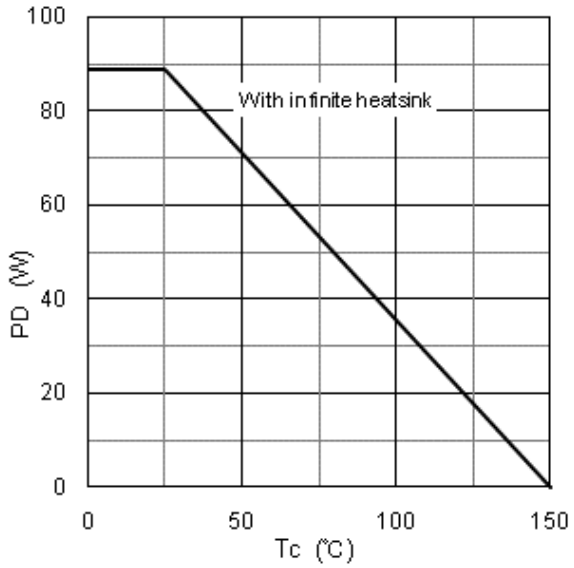


Figure 4. P_D vs. T_C

Typical Characteristic Curves

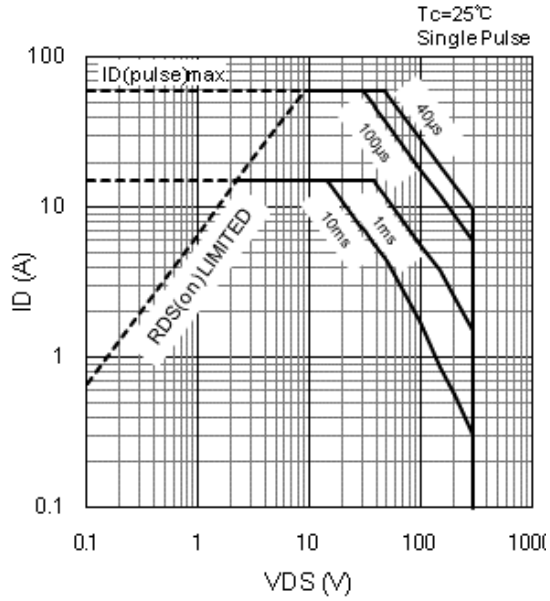


Figure 5. Safe Operating Area

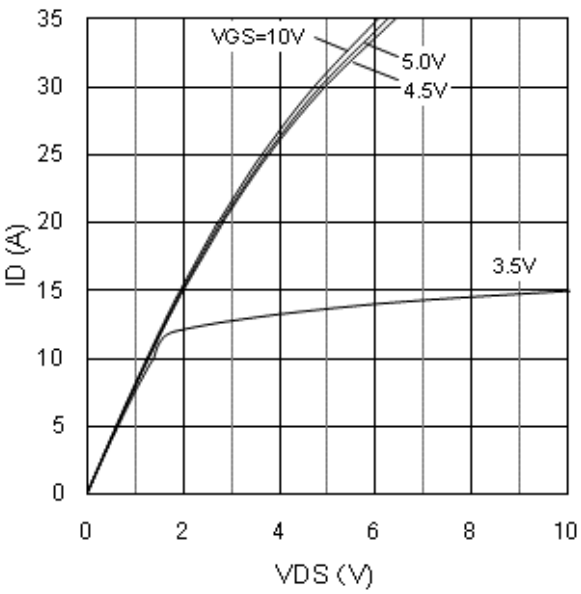


Figure 6. I_D vs. V_{DS}

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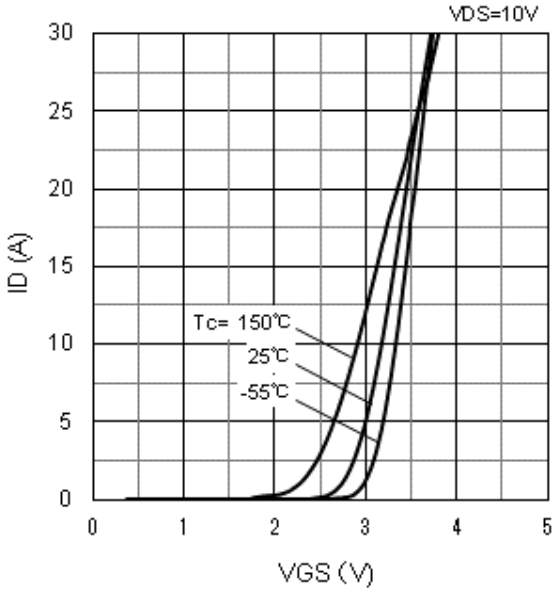


Figure 7. I_D vs. V_{GS}

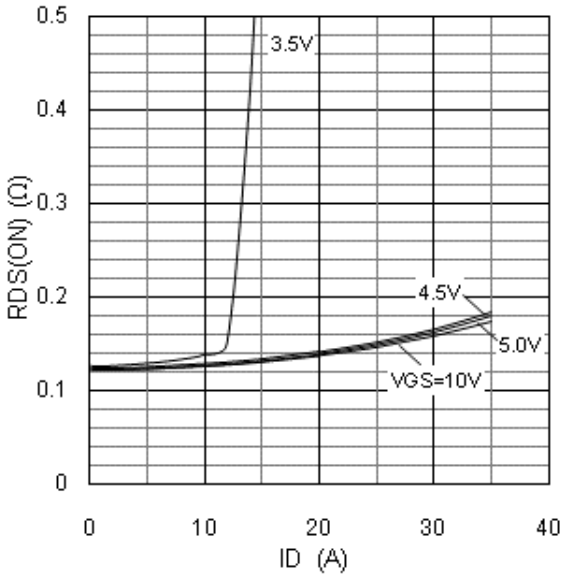


Figure 8. $R_{DS(ON)}$ vs. I_D

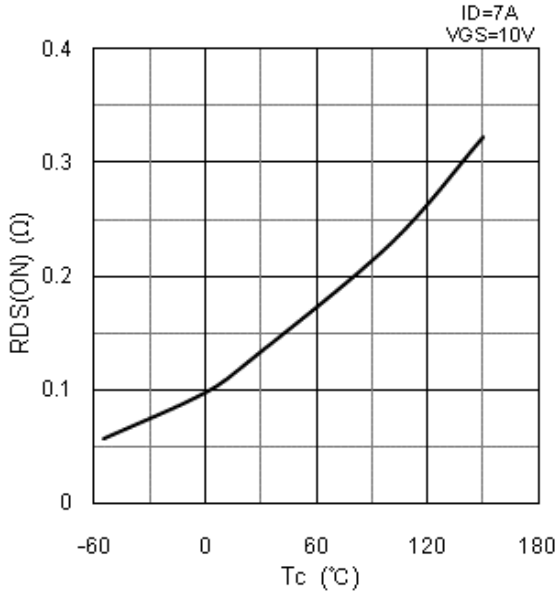


Figure 9. $R_{DS(ON)}$ vs. T_C

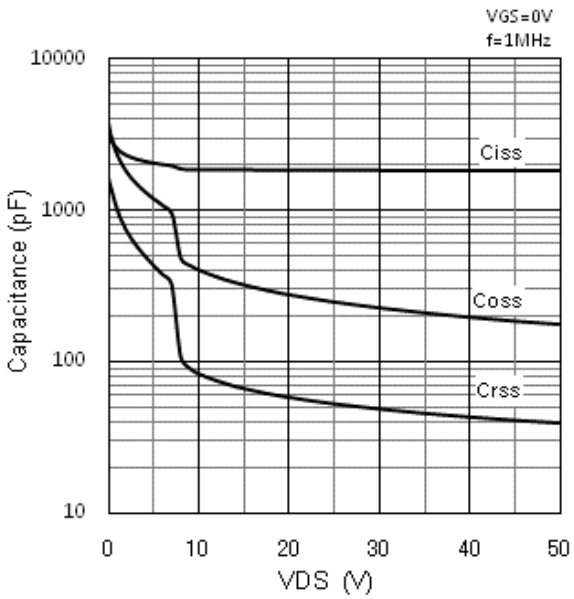


Figure 10. Capacitance vs. V_{DS}

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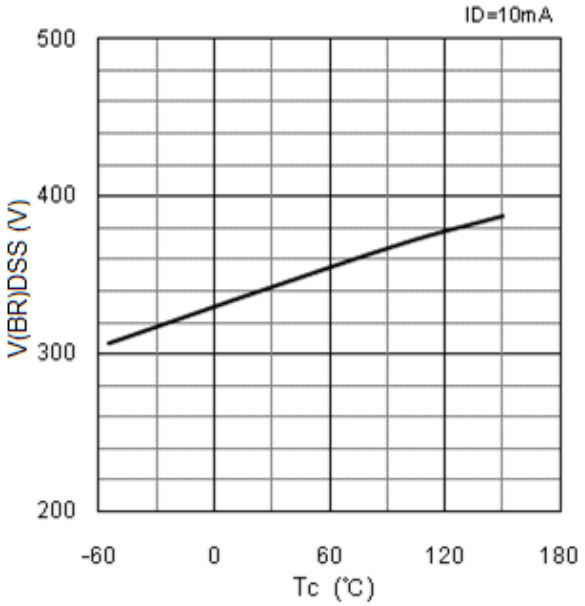


Figure 11. $V_{(BR)DSS}$ vs. T_C

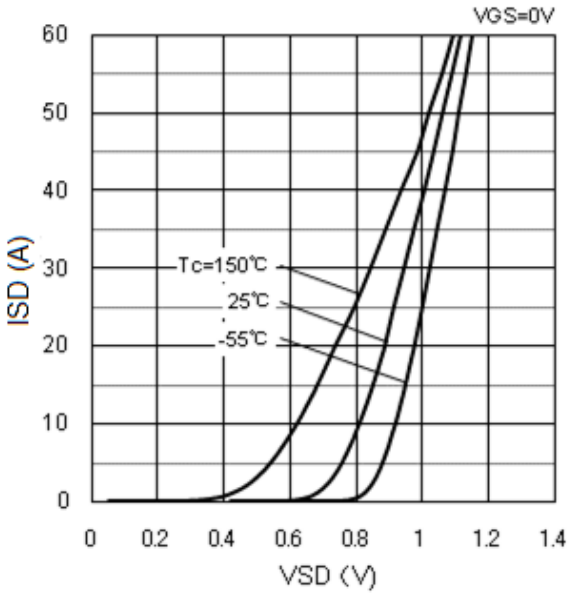


Figure 12. I_{SD} vs. V_{SD}

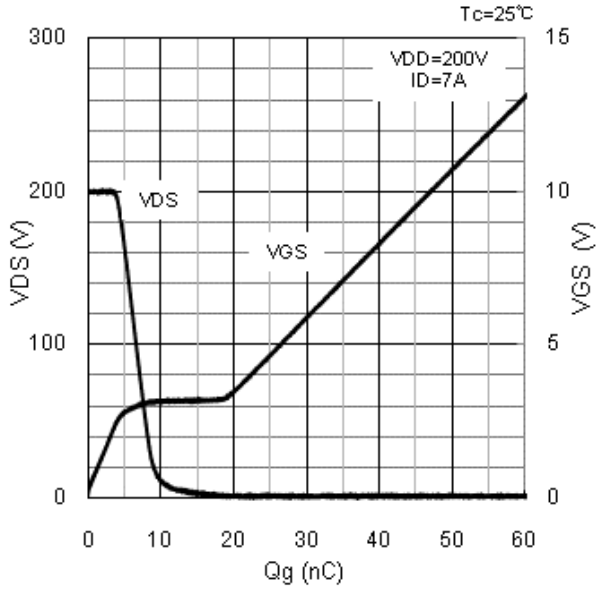


Figure 13. V_{DS} vs. Q_G

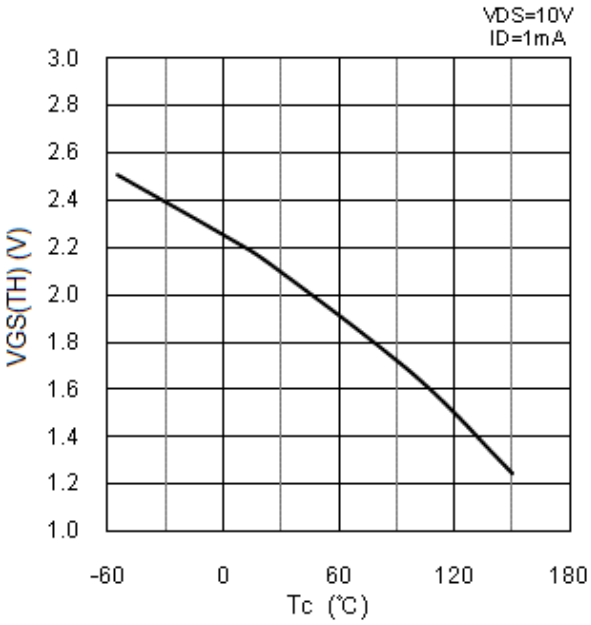


Figure 14. $V_{GS(TH)}$ vs. T_C

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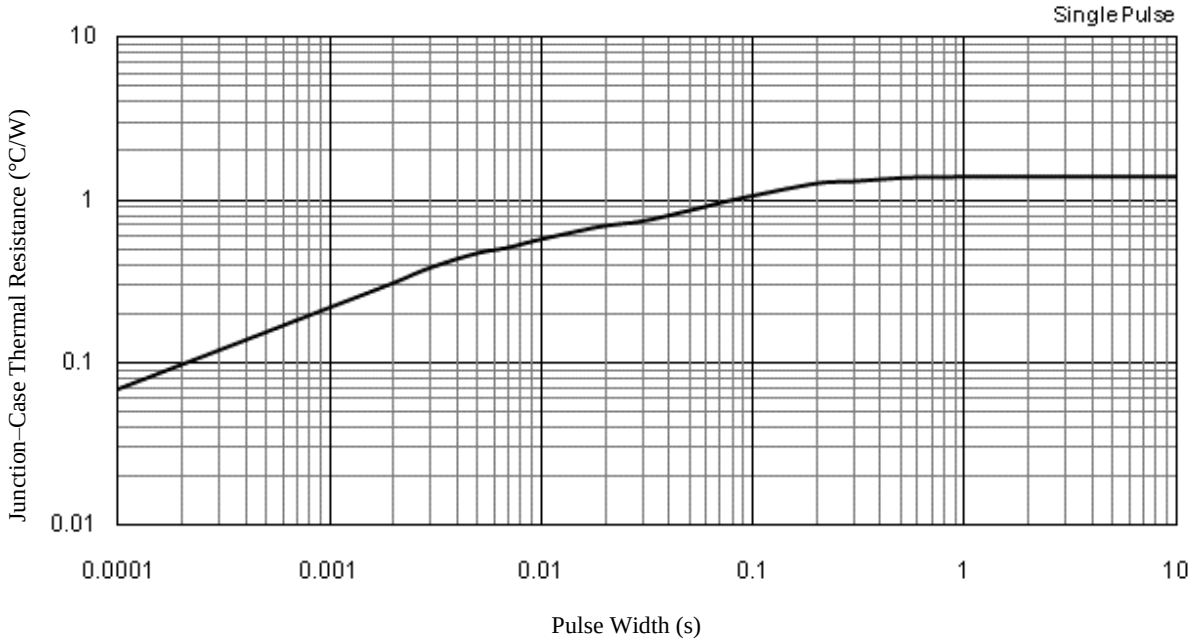
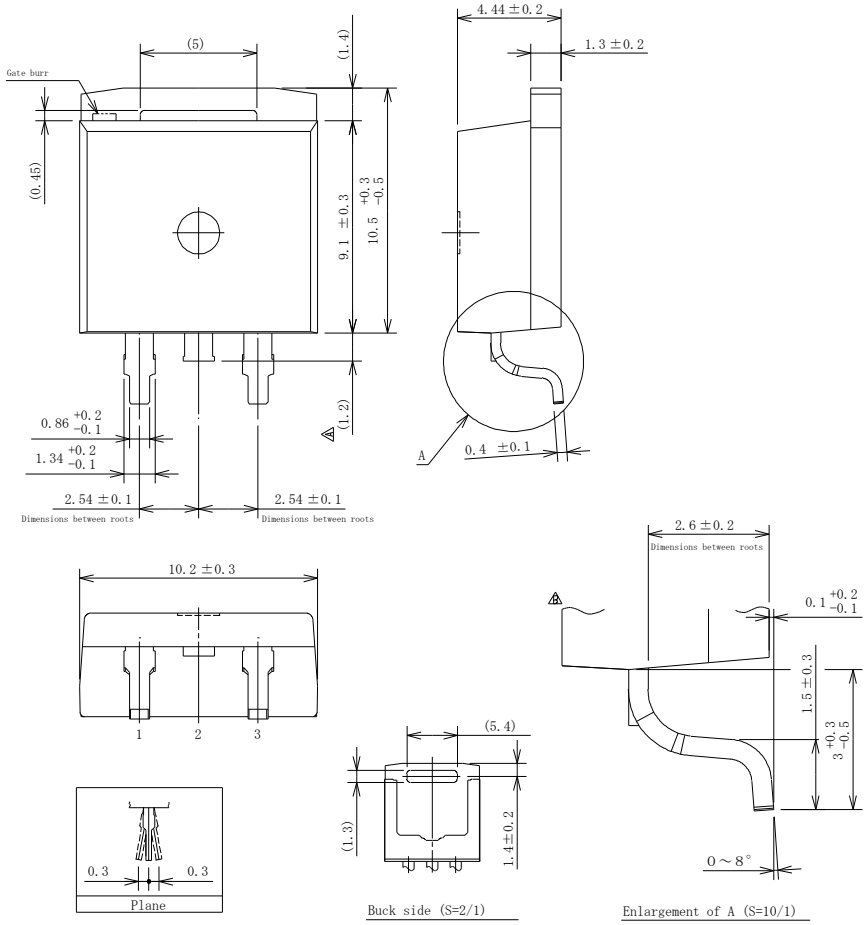


Figure 15. Transient Thermal Resistance Characteristics

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Physical Dimensions

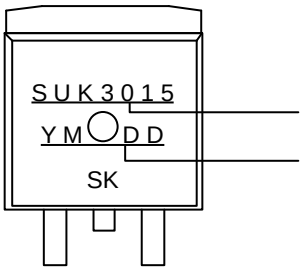
● **TO220S-2L Package**



NOTES:

- Dimensions in millimeters
- Maximum gate burr height is 0.3mm.
- Bare lead frame: Pb-free (RoHS compliant)
- Moisture Sensitivity Level 3 (MSL 3)
- When soldering the products, it is required to minimize the working time within the following limits:
  Reflow:
  Preheat: 150 °C to 200 °C / 60 s to 120 s
  Solder heating: 240 °C / 30s, 3 times (245 °C peak)
  Soldering Iron: 350 °C / 3.5 s, 1 time

Marking Diagram



Part Number

Lot Number

Y is the last digit of the year of manufacture (0 to 9)

M is the month of the year (1 to 9, O, N or D)

DD is the day of the month (01 to 31)

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