

$V_{DSS} = 300\text{ V}$, $R_{DS(ON)} = 0.15\ \Omega$
N-channel Power MOSFET
SUK3015

Description

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

Features

- Automotive Qualified
- Low On Resistance
- ESD Protection Zener on Gate
- 100% Avalanche Tested
- Compliant with RoHS directive

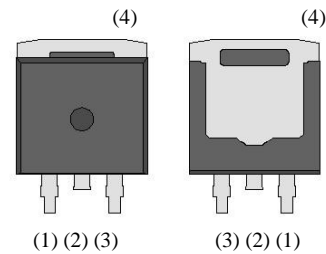
- V_{DSS} ----- 300 V ($I_D = 100\ \mu\text{A}$)
- I_D ----- $\pm 15\ \text{A}$
- $R_{DS(ON)}$ ----- 0.15 Ω max. ($I_D = 7\ \text{A}$, $V_{GS} = 10\ \text{V}$)
- t_{rr} ----- 160 ns (typ.)

Applications

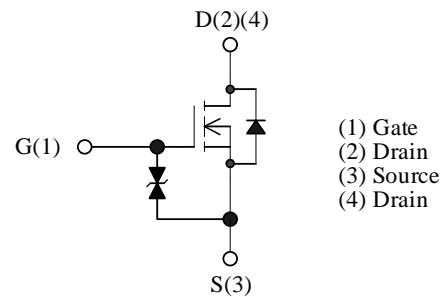
- DC/DC Converter
- Other Switched-mode Power Supply

Package

TO220S



Not to scale



Absolute Maximum Ratings

Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Test conditions	Rating	Unit
Drain to Source Voltage	V_{DSS}		300	V
Gate to Source Voltage	V_{GSS}		± 25	V
Continuous Drain Current	I_D		± 15	A
Pulsed Drain Current	$I_{D(PULSE)}$	Pulse width $\leq 100\text{ }\mu\text{s}$ Duty cycle $\leq 1\%$	± 60	A
Single Pulse Avalanche Energy	E_{AS}	$V_{DD} = 49\text{ V}$, $L = 120\text{ }\mu\text{H}$, $I_{AS} = 26.7\text{ A}$, $V_{GS} = 16\text{ V}$, $R_G = 0\text{ }\Omega$, unclamped, see Figure 1.	50	mJ
Avalanche Current	I_{AS}		26.7	A
Power Dissipation	P_D	$T_C = 25\text{ }^\circ\text{C}$	89	W
Drain to Source dv/dt 1	dv/dt 1	$V_{DD} = 49\text{ V}$, $L = 120\text{ }\mu\text{H}$, $I_{AS} = 26.7\text{ A}$, $V_{GS} = 16\text{ V}$, $R_G = 0\text{ }\Omega$, unclamped, see Figure 1.	3.0	V/ns
Peak Diode Recovery dv/dt 2	dv/dt 2	$V_{DD} = 200\text{ V}$, $L = 0.2\text{ mH}$, $I_{SDP} = 15\text{ A}$, see エラー! 参照元が見つかりません。 .	8.5	V/ns
Peak Diode Recovery di/dt	di/dt	$V_{DD} = 200\text{ V}$, $L = 0.2\text{ mH}$, $I_{SDP} = 15\text{ A}$, see エラー! 参照元が見つかりません。 .	190	A/ μs
Operating Junction Temperature	T_J		150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}		- 55 to 150	$^\circ\text{C}$

Thermal Characteristics

Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$

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

Electrical Characteristics

Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 100\ \mu\text{A}$, $V_{GS} = 0\ \text{V}$	300	–	–	V
Drain to Source Leakage Current	I_{DSS}	$V_{DS} = 300\ \text{V}$, $V_{GS} = 0\ \text{V}$	–	–	100	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\ \text{V}$	–	–	10	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = 10\ \text{V}$, $I_D = 1\ \text{mA}$	1.5	2.0	2.5	V
Forward Transconductance	$R_{e(yfs)}$	$V_{DS} = 10\ \text{V}$, $I_D = 7\ \text{A}$	11	–	–	S
Static Drain to Source On-Resistance	$R_{DS(ON)}$	$I_D = 7\ \text{A}$, $V_{GS} = 10\ \text{V}$	–	–	0.15	Ω
Input Capacitance	C_{iss}	$V_{DS} = 10\ \text{V}$ $V_{GS} = 0\ \text{V}$ $f = 1\ \text{MHz}$	–	1800	–	pF
Output Capacitance	C_{oss}		–	420	–	
Reverse Transfer Capacitance	C_{rss}		–	85	–	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200\ \text{V}$ $I_D = 7\ \text{A}$ $V_{GS} = 10\ \text{V}$, $R_G = 15.6\ \Omega$, $R_L = 28.6\ \Omega$, see Figure 2.	–	15	–	ns
Rise Time	t_r		–	34	–	
Turn-Off Delay Time	$t_{d(off)}$		–	112	–	
Fall Time	t_f		–	144	–	
Source to Drain Diode Forward Voltage	V_{SD}	$I_{SD} = 7\ \text{A}$, $V_{GS} = 0\ \text{V}$	–	–	1.2	V
Source to Drain Diode Reverse Recovery Time	t_{rr}	$I_{SDP} = 15\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$, see エラー! 参照元が見つかりません。 .	–	160	–	ns

Test Circuits and Waveforms

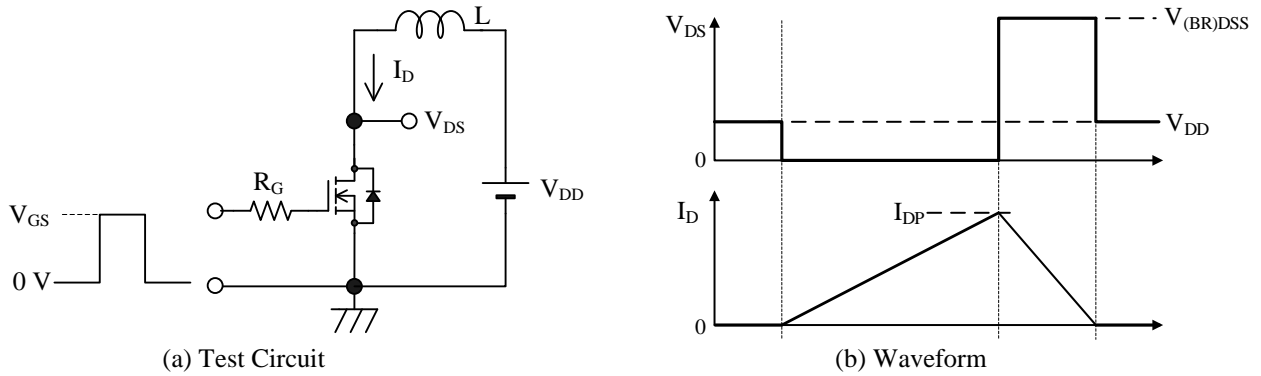


Figure 1 Unclamped Inductive Switching

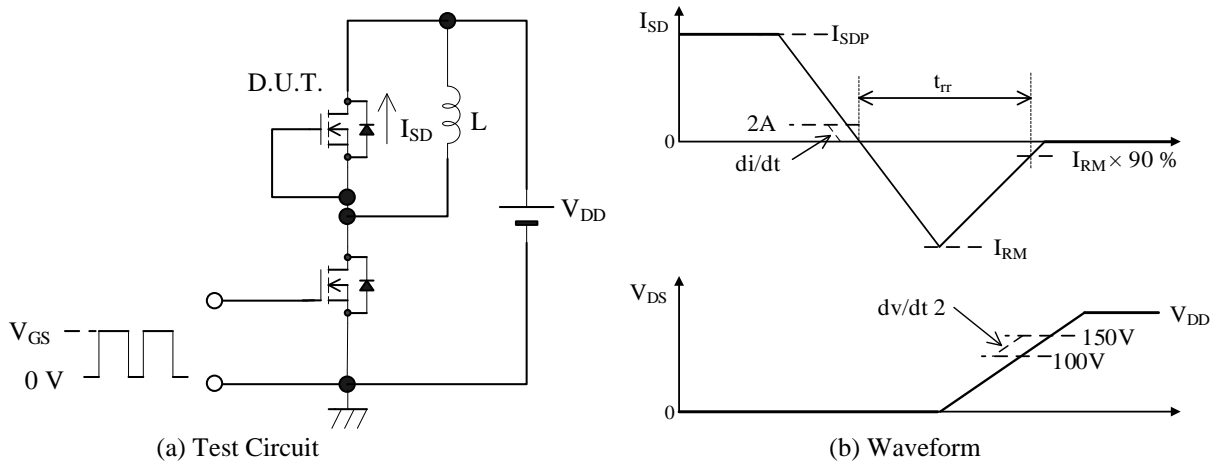


Figure 2 Diode Reverse Recovery Time

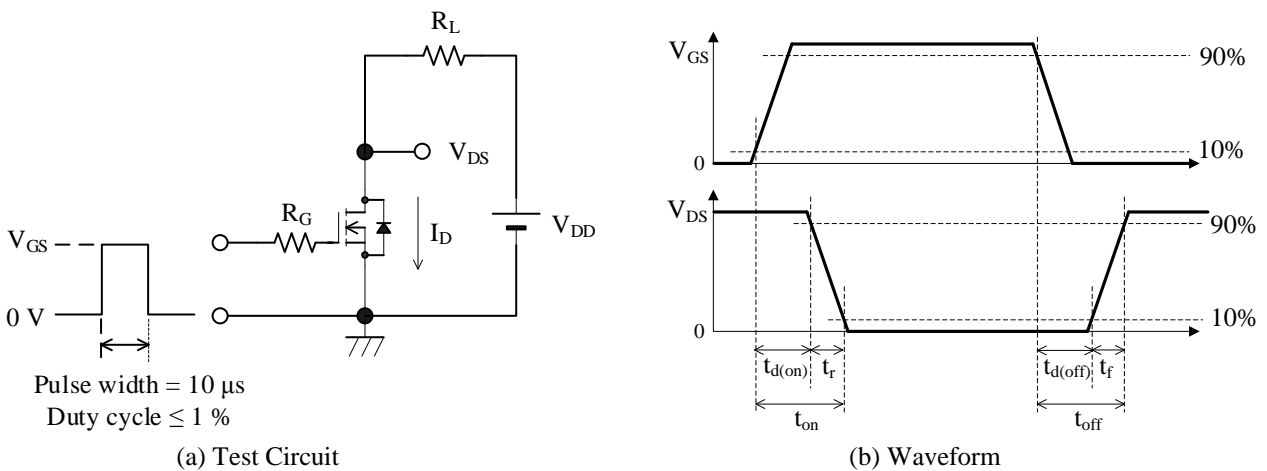


Figure 3 Switching Time

Ratings and Characteristics Curves

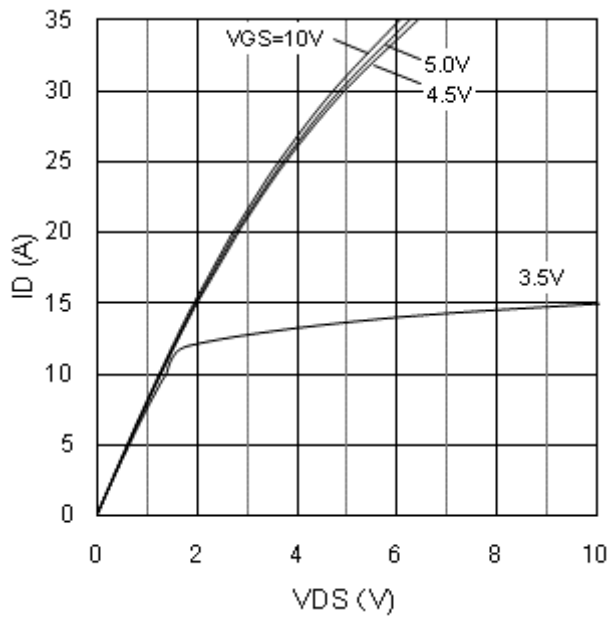


Figure 4 ID vs. VDS characteristics (typ.)

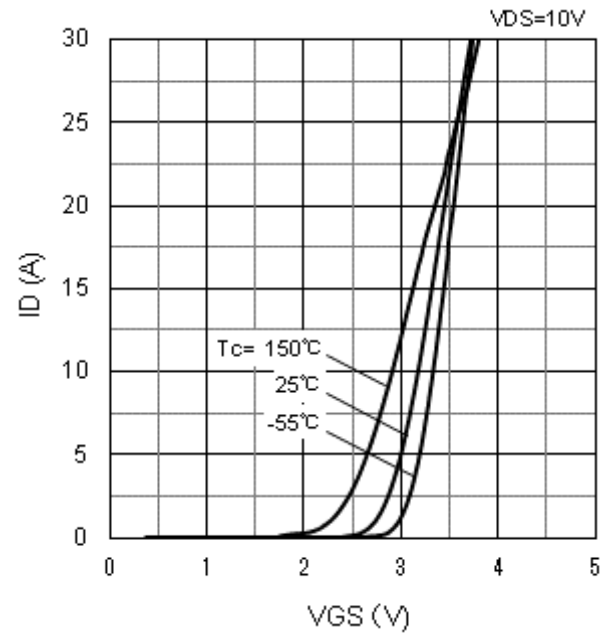


Figure 5 ID vs. VGS characteristics (typ.)

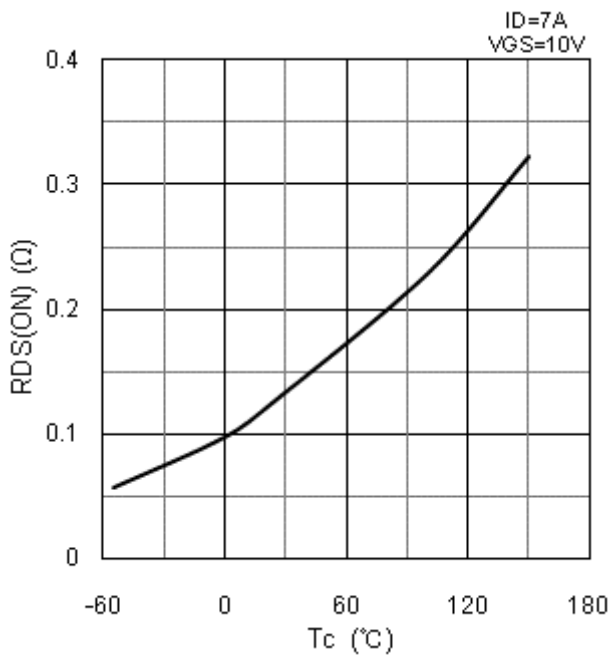


Figure 6 RDS(ON) vs. Tc characteristics (typ.)

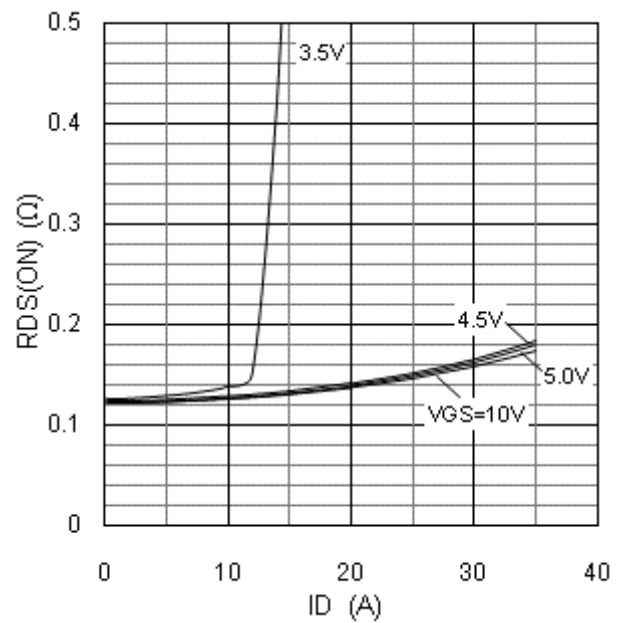


Figure 7 RDS(ON) vs. ID characteristics (typ.)

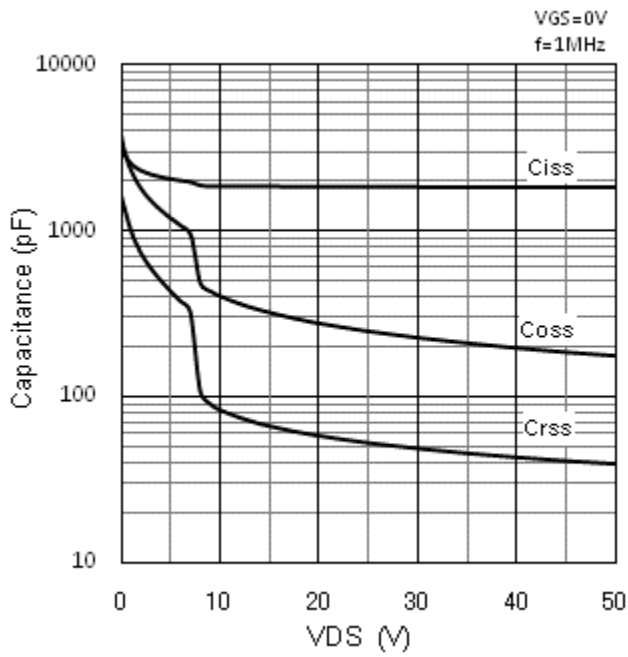


Figure 8 Capacitance vs. V_{DS} characteristics (typ.)

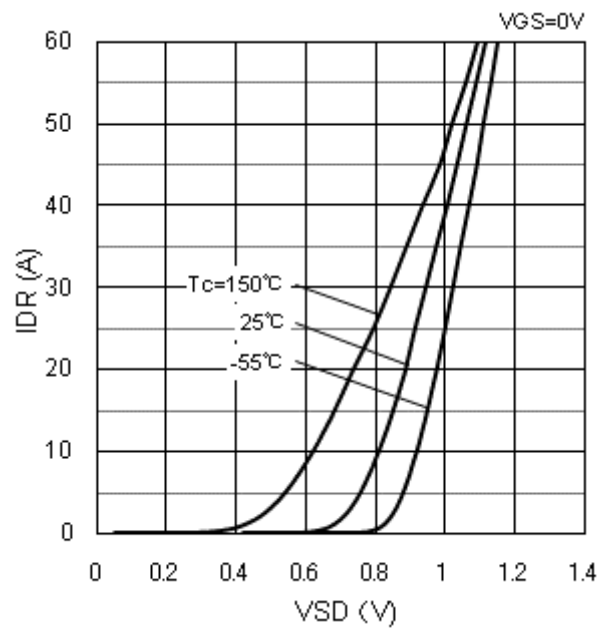


Figure 9 I_{DR} vs. V_{SD} characteristics (typ.)

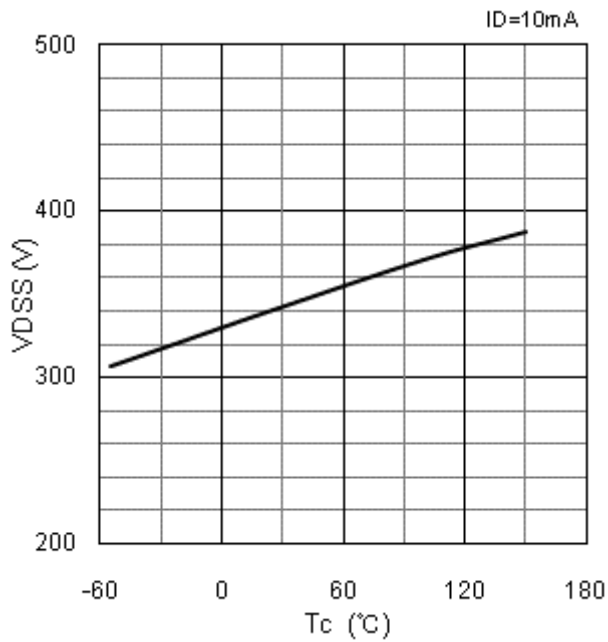


Figure 10 V_{DSS} vs. T_c characteristics (typ.)

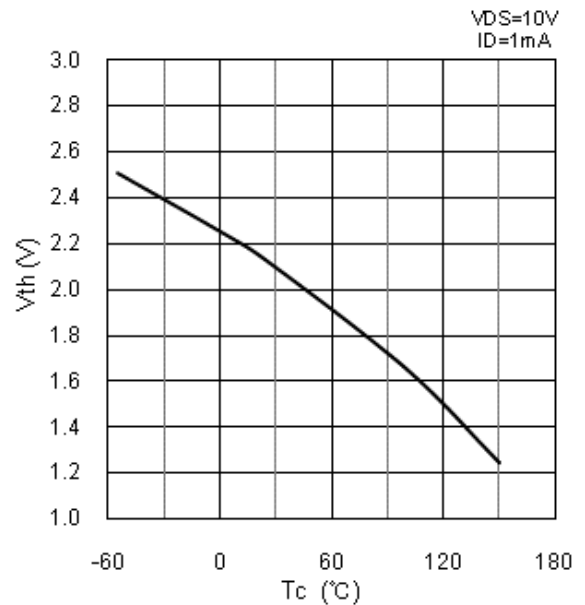


Figure 11 V_{th} vs. T_c characteristics (typ.)

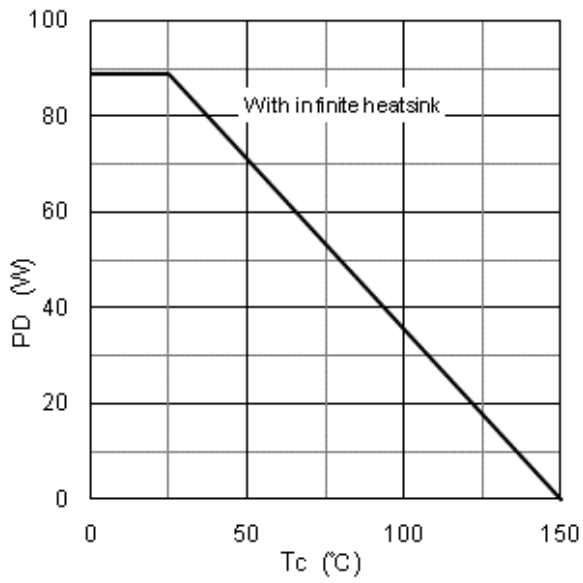


Figure 12 PD vs. Tc characteristics (typ.)

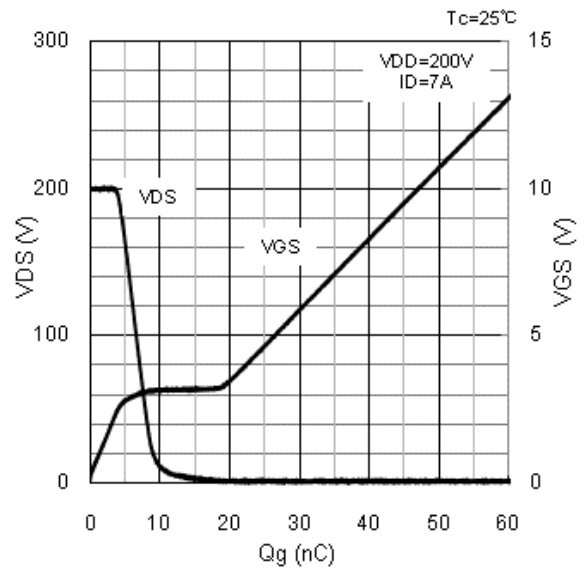


Figure 13 Dynamic input / output characteristics (typ.)

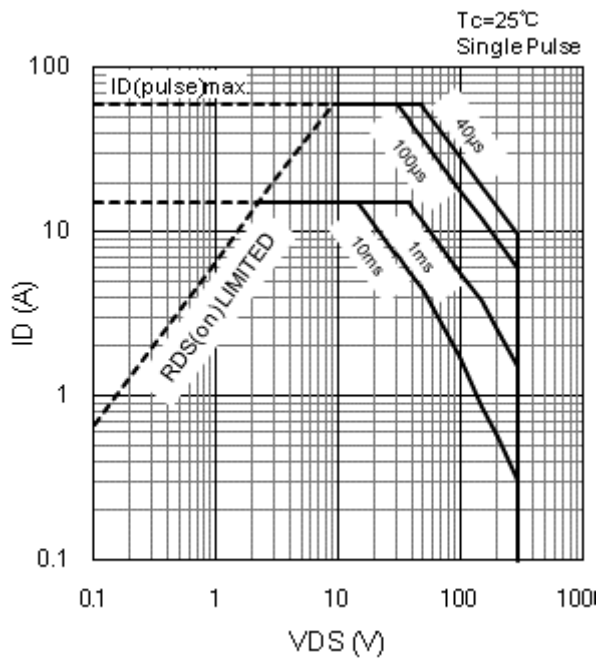


Figure 14 Safe operating area

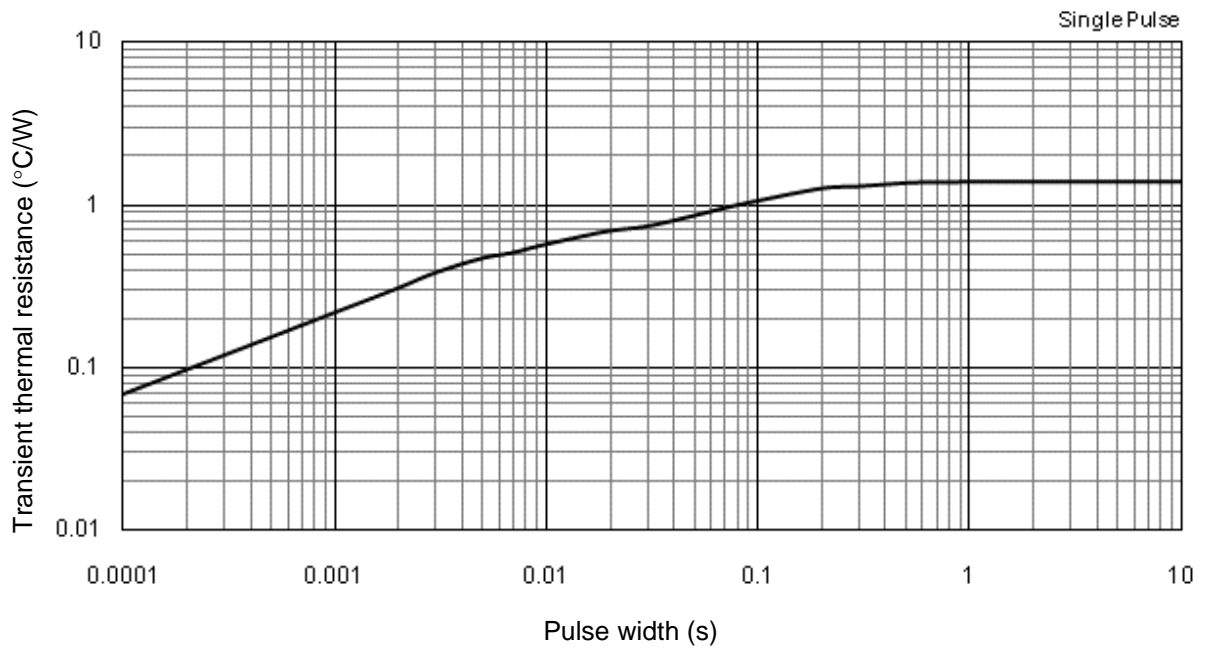
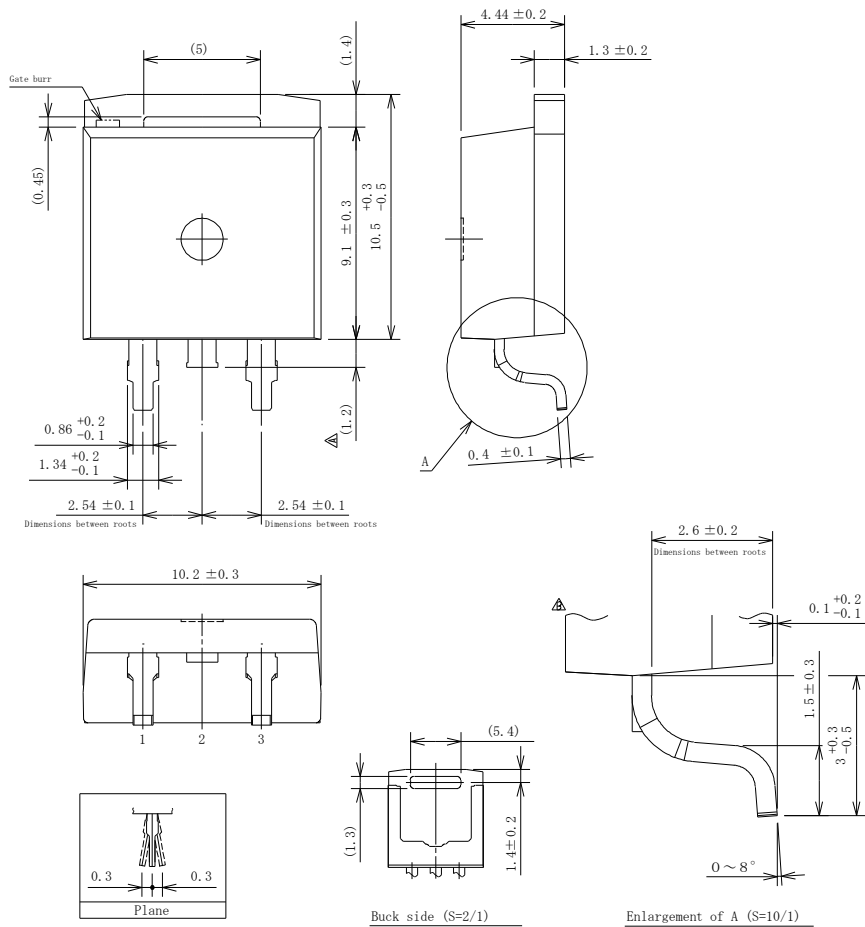


Figure 15. Transient thermal resistance

SUK3015

Physical Dimensions

- TO220S package



NOTES:

- Dimensions in millimeters
- Lead treatment: Pb-free (RoHS compliant)
- Gate burr indicates protrusion of 0.3 mm (max.).
- When soldering the products, make sure to minimize the working time, within the following limits:

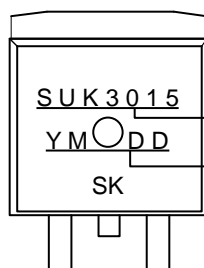
Reflow (MSL 3)

Preheat: 170 to 190 °C / 110 s

Solder heating: 220 to 250 °C / 60s (3 times)

Soldering iron: 380 ± 10 °C / 3.5 ± 0.5 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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