

40 V, 17 A P-channel Trench Power MOSFET with Reverse Battery Protection DJR0417

Description

DJR0417 is P-channel trench power MOSFET designed for the load switch of automotive electronic units requiring the reverse battery protection. Since DJR0417 has a bidirectional diode between Drain and Source, the reverse battery protection can be realized with only one load switch.

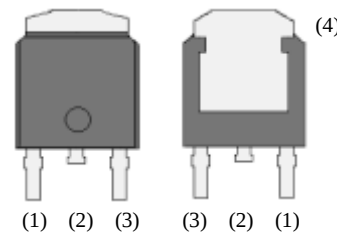
Features

- $V_{(BR)DSS}$ ----- - 40 V ($I_D = -100 \mu A$)
- I_D ----- - 17 A
- $R_{DS(ON)}$ ----- 75 m Ω max. ($I_D = -8.5 A$, $V_{GS} = -10 V$)

- Automotive Qualified
- Load switch can configure by only one component
- For reverse battery protection
- Compliant with RoHS Directive

Package

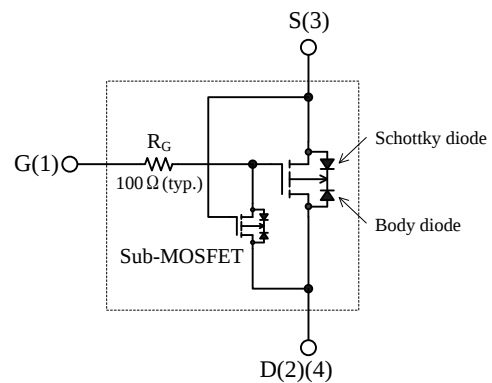
TO252



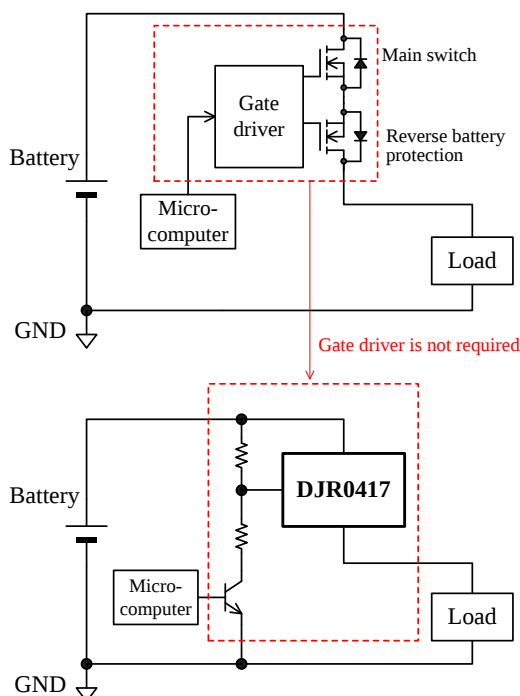
- (1) Gate
- (2)(4) Drain
- (3) Source

Not to Scale

Equivalent circuit



Typical Application



Application

- Car battery

Absolute Maximum Ratings

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

Parameter	Symbol	Test conditions	Rating	Unit
Drain to Source Voltage	V_{DS}		- 40	V
Source to Drain Voltage	V_{SD}		- 16	V
Gate to Source Voltage	V_{GS}		- 15, + 0	V
Continuous Drain Current	I_D	$T_C = 25\text{ }^{\circ}\text{C}$	- 17	A
Single Pulse Avalanche Energy	E_{AS}	$V_{DD} = -15\text{ V}$, $L = 1\text{ mH}$, $I_{AS} = -17\text{ A}$, unclamped, Refer to Figure 1	230	mJ
Power Dissipation	P_D	$T_C = 25\text{ }^{\circ}\text{C}$	48	W
Operating Junction Temperature	T_J		- 55 to 150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}		- 55 to 150	$^{\circ}\text{C}$
Maximum Drain to Source dv/dt	dv/dt		0.075	V/ns

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)	$R_{\theta JC}$		-	-	2.6	$^{\circ}\text{C/W}$

Electrical Characteristic

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -100\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	- 40	-	-	V
Drain to Source Leakage Current	I_{DSS}	$V_{DS} = -40\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	- 100	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = -15\text{ V}$	-	-	- 100	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = -10\text{ V}$, $I_D = -1\text{ mA}$	- 1.0	- 1.75	- 2.5	V
Static Drain to Source On-Resistance	$R_{DS(on)}$	$I_D = -8.5\text{ A}$, $V_{GS} = -10\text{ V}$	-	50	75	$\text{m}\Omega$
		$I_D = -5\text{ A}$, $V_{GS} = -4.5\text{ V}$	-	130	350	$\text{m}\Omega$
Total Gate Charge ($V_{GS} = 10\text{ V}$)	Q_g	$V_{DS} = -15\text{ V}$ $I_D = -8.5\text{ A}$ $V_{GS} = -10\text{ V}$	-	75	-	nC
Gate to Source Charge	Q_{gs}		-	9	-	
Gate to Drain Charge	Q_{gd}		-	30	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$ $I_D = -8.5\text{ A}$ $R_G = 10\text{ }\Omega$, $R_L = 1.53\text{ }\Omega$, $R_{GS} = 50\text{ }\Omega$ $V_{GS} = -10\text{ V}$ Refer to Figure 2	-	90	-	ns
Rise Time	t_r		-	450	-	
Turn-Off Delay Time	$t_{d(off)}$		-	990	-	
Fall Time	t_f		-	910	-	
Source to Drain Breakdown Voltage	$V_{(BR)SD}$	$I_S = -1\text{ mA}$, $V_{GS} = 0\text{ V}$	- 16	-	-	V

Test Circuits and Waveforms

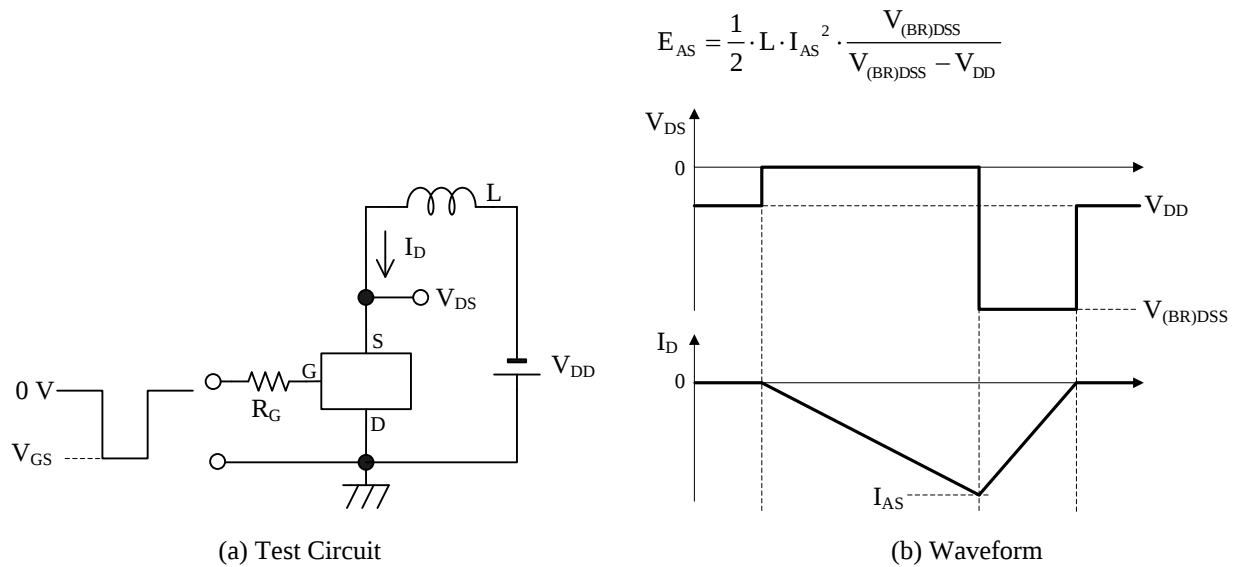


Figure 1 Unclamped Inductive Switching

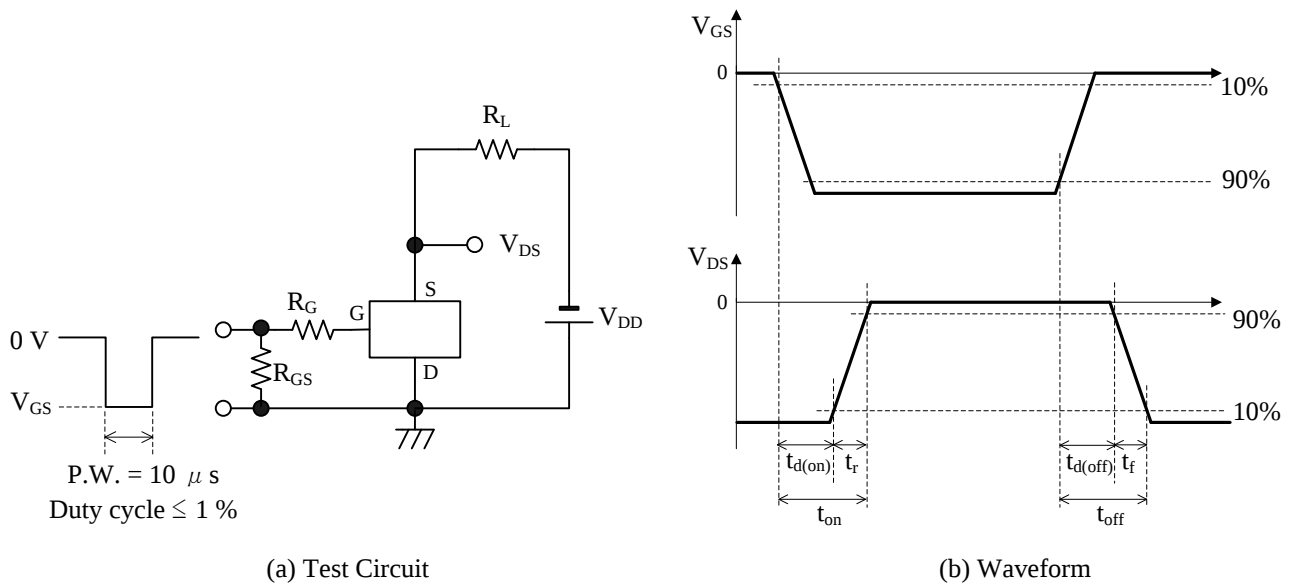
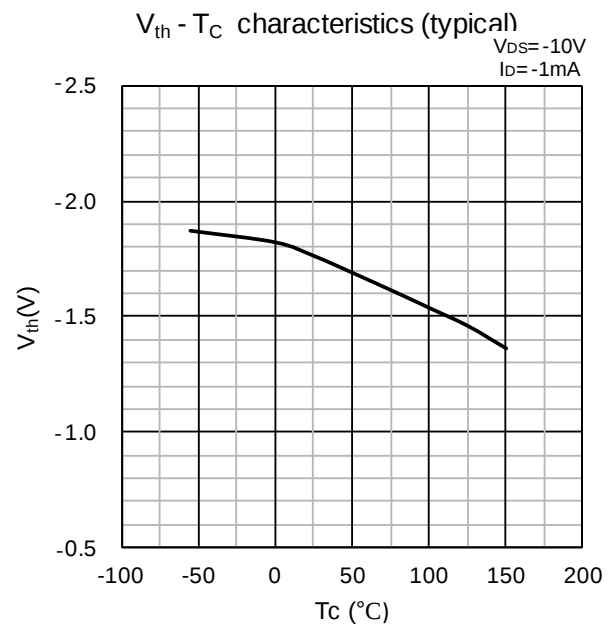
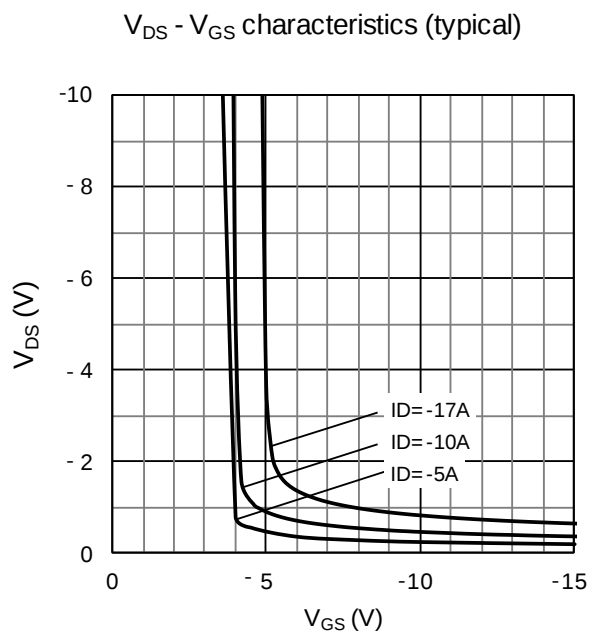
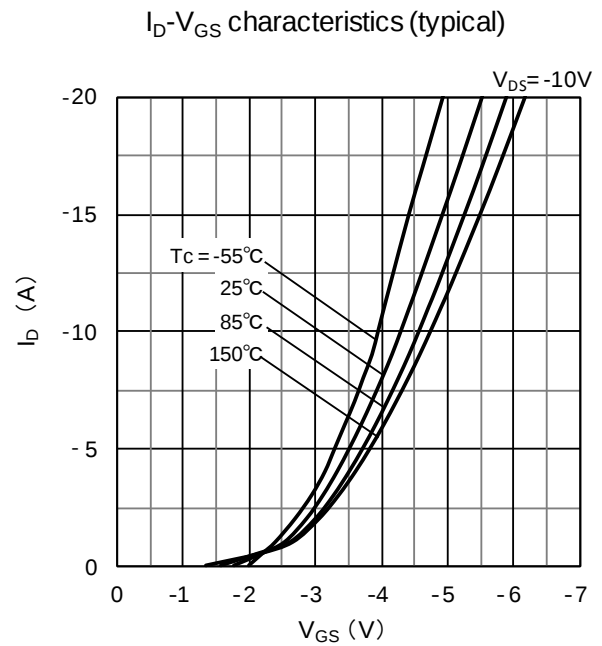
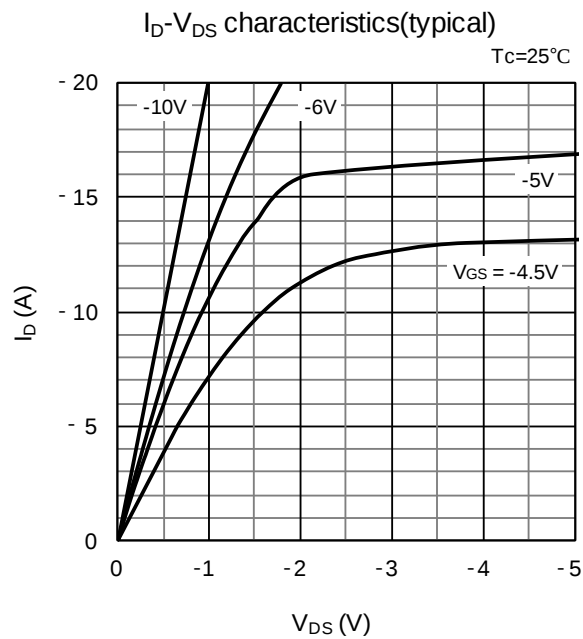
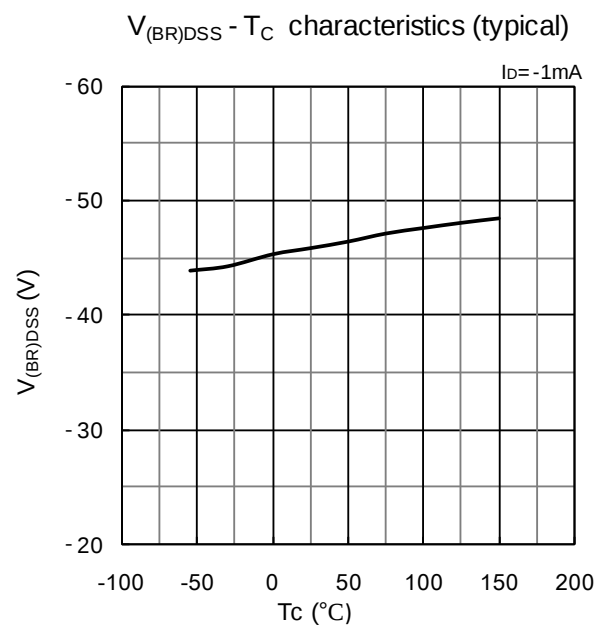
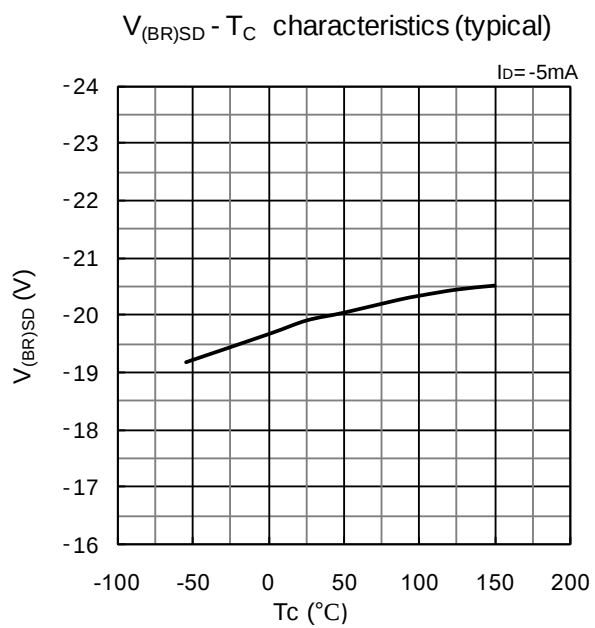
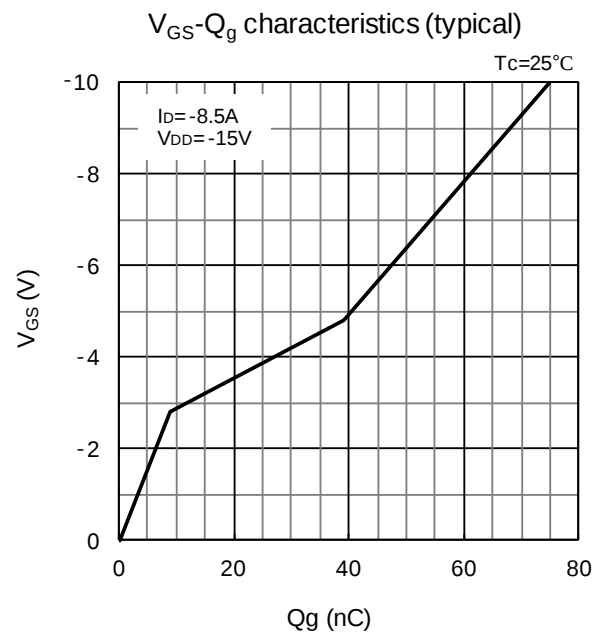
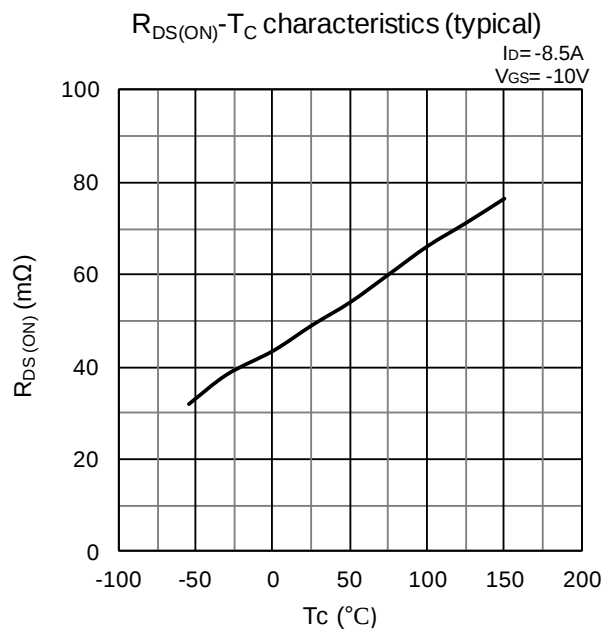
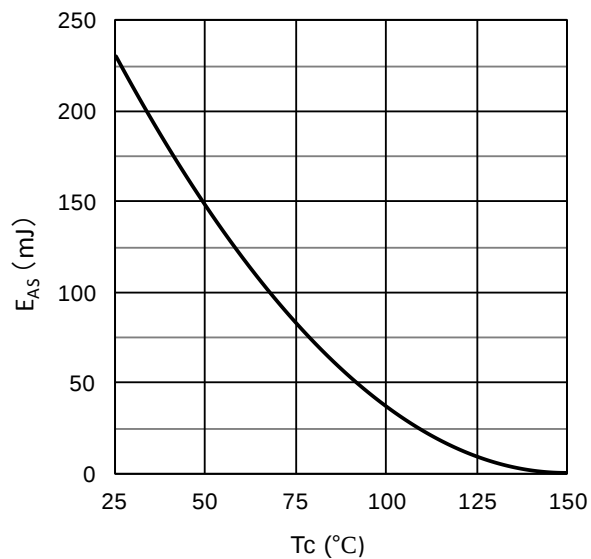
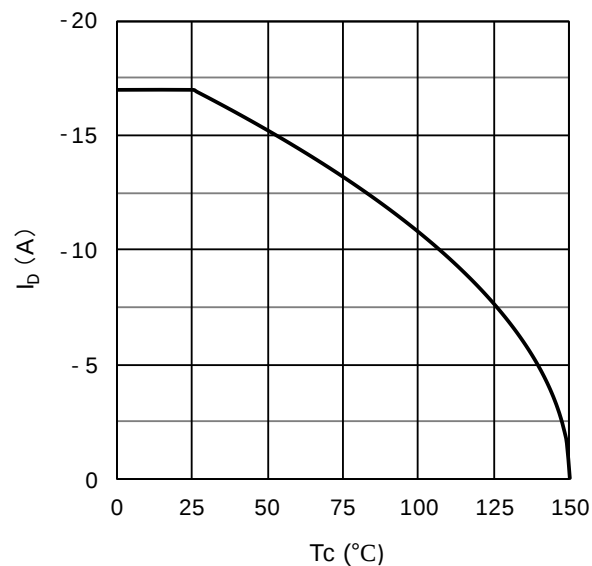
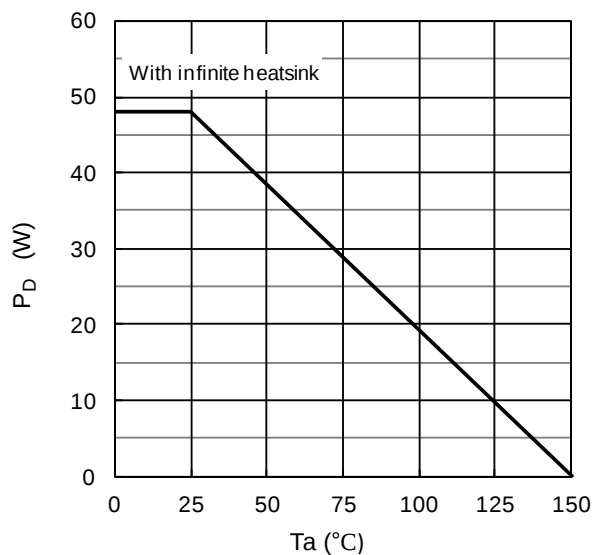


Figure 2 Switching Time

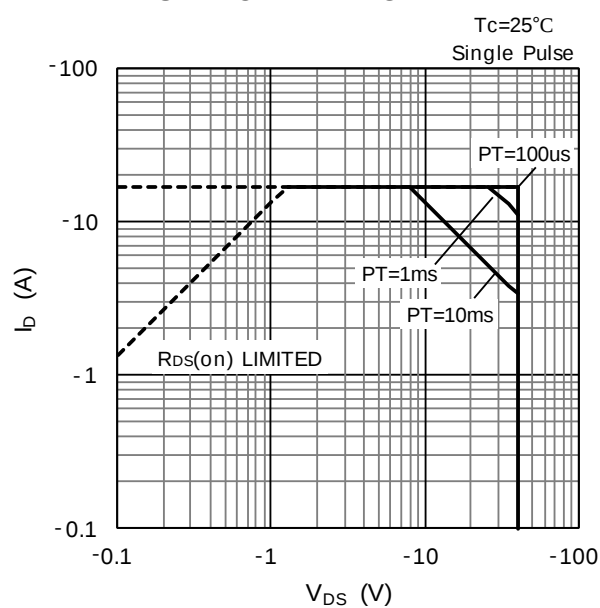
Performance Curves

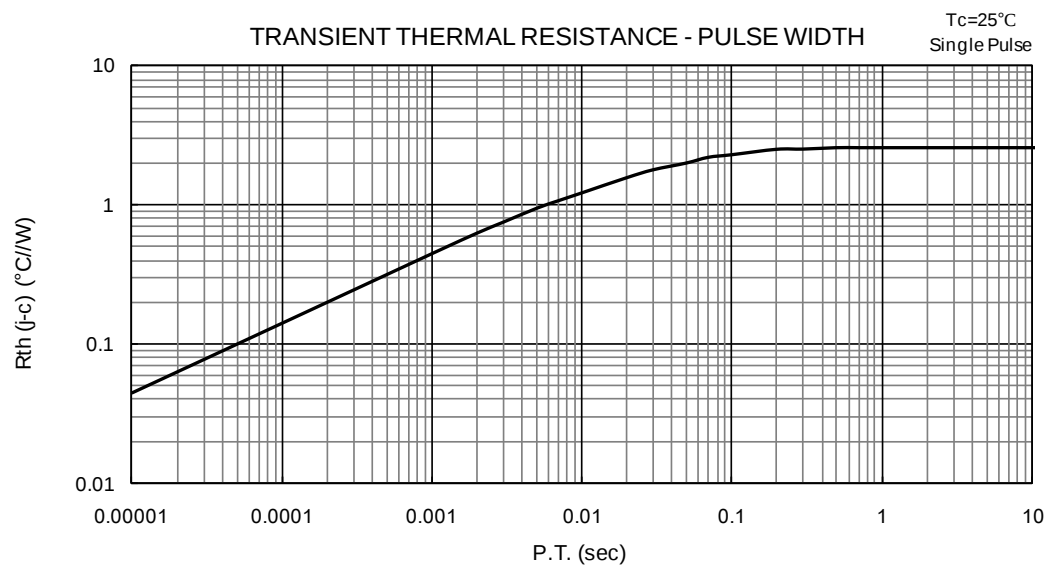




E_{AS} - T_c characteristics I_D - T_c characteristics P_D - T_a Derating

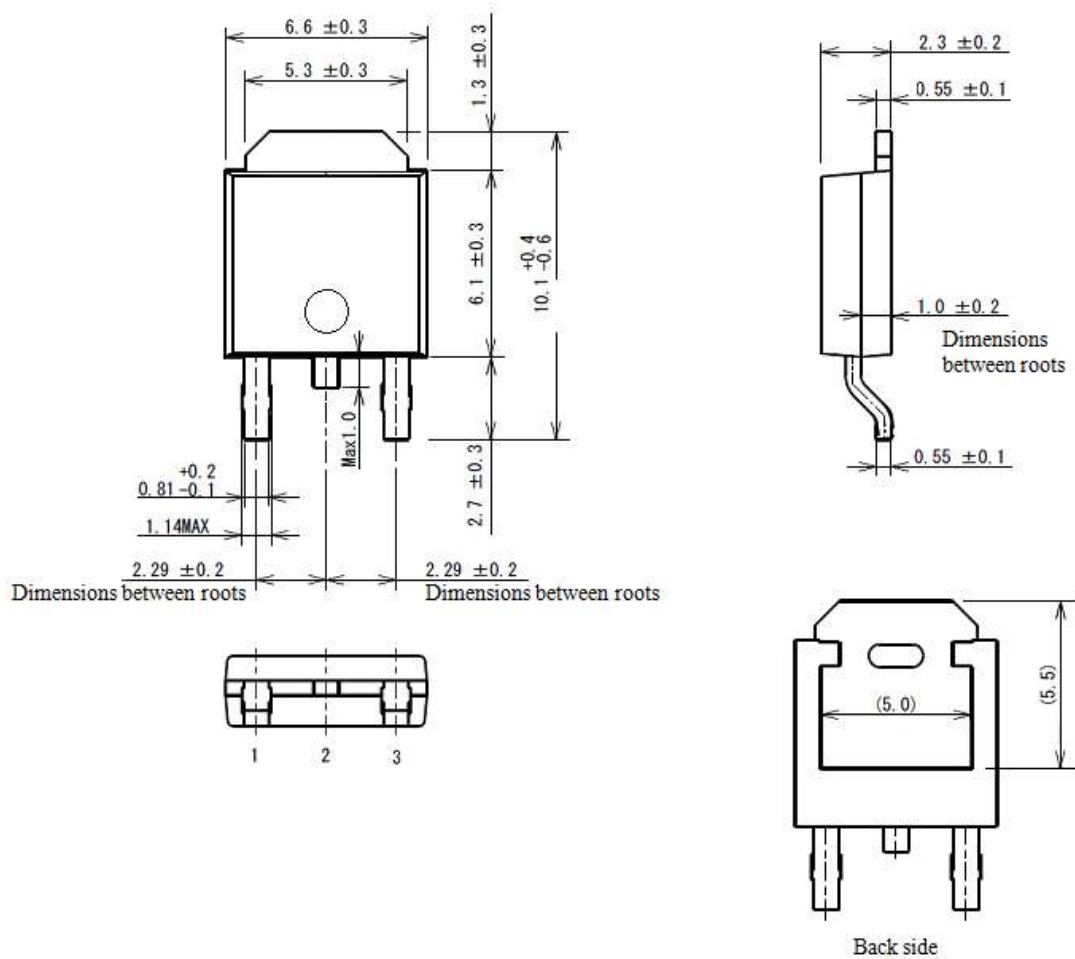
SAFE OPERATING AREA





External Dimensions

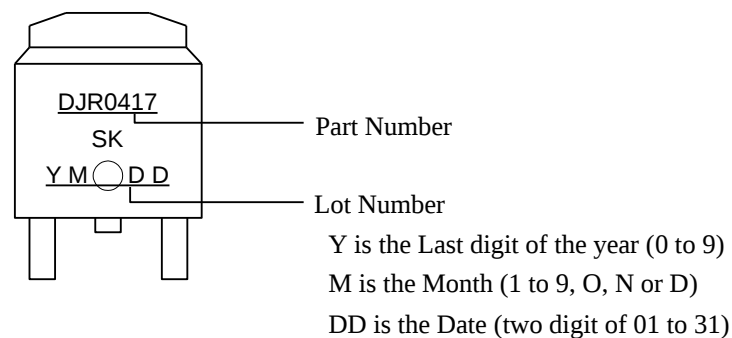
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NOTES:

- Dimension is in millimeters
- Pb-free. Device composition compliant with the RoHS directive

Marking Diagram



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