

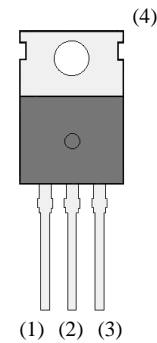
**40 V, 80 A, 4.1 mΩ Low RDS(ON)
N ch Trench Power MOSFET
EKI04047**

Features

- $V_{(BR)DSS}$ ----- 40 V ($I_D = 100 \mu A$)
- I_D ----- 80 A
- $R_{DS(ON)}$ ----- 5.2 mΩ max. ($V_{GS} = 10 V, I_D = 42.8 A$)
- Q_g ----- 16.0 nC ($V_{GS} = 4.5 V, V_{DS} = 20 V, I_D = 42.8 A$)
- Low Total Gate Charge
- High Speed Switching
- Low On-Resistance
- Capable of 4.5 V Gate Drive
- 100 % UIL Tested
- RoHS Compliant

Package

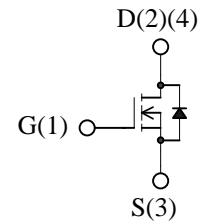
- TO220-3L



Not to scale

Applications

- DC-DC converters
- Synchronous Rectification
- Power Supplies



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
Gate to Source Voltage	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C = 25 \text{ }^\circ\text{C}$	80	A
Pulsed Drain Current	I_{DM}	$PW \leq 100\mu s$ Duty cycle $\leq 1 \%$	161	A
Continuous Source Current (Body Diode)	I_S		80	A
Pulsed Source Current (Body Diode)	I_{SM}	$PW \leq 100\mu s$ Duty cycle $\leq 1 \%$	161	A
Single Pulse Avalanche Energy	E_{AS}	$V_{DD} = 20 V, L = 1 mH,$ $I_{AS} = 9.4 A, \text{ unclamped,}$ $R_G = 4.7 \Omega$ Refer to Figure 1	89	mJ
Avalanche Current	I_{AS}		16.7	A
Power Dissipation	P_D	$T_C = 25 \text{ }^\circ\text{C}$	90	W
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, $T_A = 25\text{ }^\circ\text{C}$

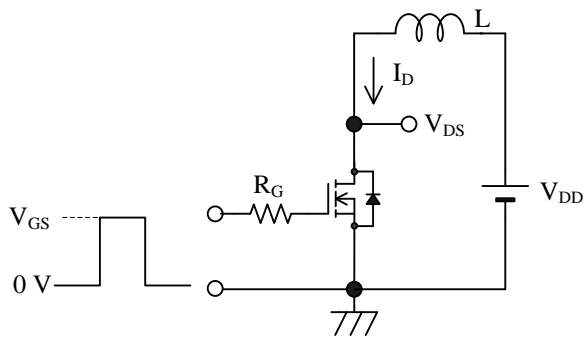
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Thermal Resistance (Junction to Case)	$R_{\theta JC}$		–	–	1.4	$^\circ\text{C}/\text{W}$
Thermal Resistance (Junction to Ambient)	$R_{\theta JA}$		–	–	62.5	$^\circ\text{C}/\text{W}$

Electrical Characteristics

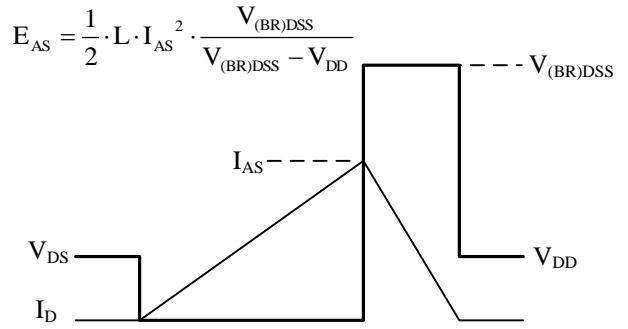
• Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 100\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	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}	$V_{GS} = \pm 20\text{ V}$	–	–	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 650\text{ }\mu\text{A}$	1.0	2.0	2.5	V
Static Drain to Source On-Resistance	$R_{DS(on)}$	$I_D = 42.8\text{ A}$, $V_{GS} = 10\text{ V}$	–	4.1	5.2	$\text{m}\Omega$
		$I_D = 21.4\text{ A}$, $V_{GS} = 4.5\text{ V}$	–	5.4	7.0	$\text{m}\Omega$
Gate Resistance	R_G	$f = 1\text{ MHz}$	–	1.5	–	Ω
Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}$ $V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$	–	2410	–	pF
Output Capacitance	C_{oss}		–	395	–	
Reverse Transfer Capacitance	C_{rss}		–	190	–	
Total Gate Charge ($V_{GS} = 10\text{ V}$)	Q_{g1}	$V_{DS} = 20\text{ V}$ $I_D = 42.8\text{ A}$	–	35.0	–	nC
Total Gate Charge ($V_{GS} = 4.5\text{ V}$)	Q_{g2}		–	16.0	–	
Gate to Source Charge	Q_{gs}		–	5.6	–	
Gate to Drain Charge	Q_{gd}		–	6.0	–	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20\text{ V}$ $I_D = 42.8\text{ A}$ $V_{GS} = 10\text{ V}$, $R_G = 4.7\text{ }\Omega$ Refer to Figure 2	–	4.1	–	ns
Rise Time	t_r		–	5.6	–	
Turn-Off Delay Time	$t_{d(off)}$		–	19.7	–	
Fall Time	t_f		–	11.9	–	
Source to Drain Diode Forward Voltage	V_{SD}	$I_S = 42.8\text{ A}$, $V_{GS} = 0\text{ V}$	–	0.9	1.5	V
Source to Drain Diode Reverse Recovery Time	t_{rr}	$I_F = 42.8\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ Refer to Figure 3	–	32.9	–	ns
Source to Drain Diode Reverse Recovery Charge	Q_{rr}		–	30.3	–	nC

Test Circuits and Performance Curves

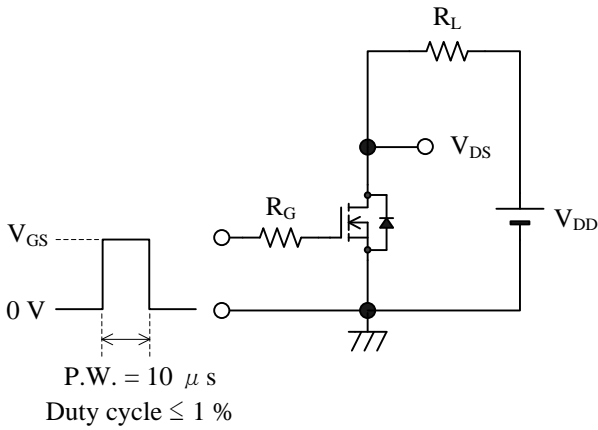


(a) Test Circuit

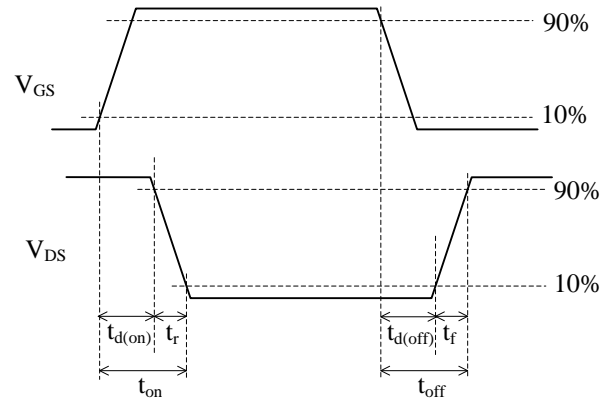


(b) Waveform

Figure 1. Unclamped Inductive Switching

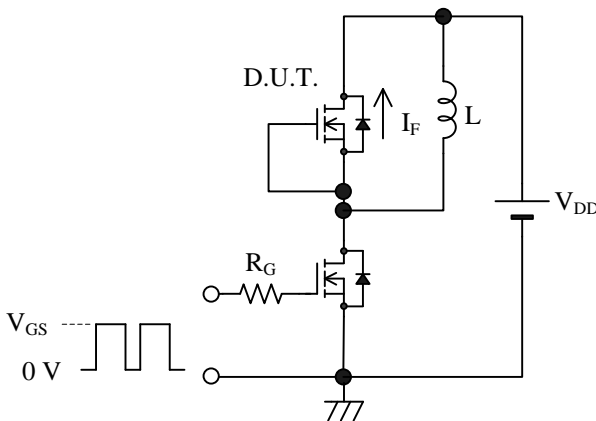


(a) Test Circuit

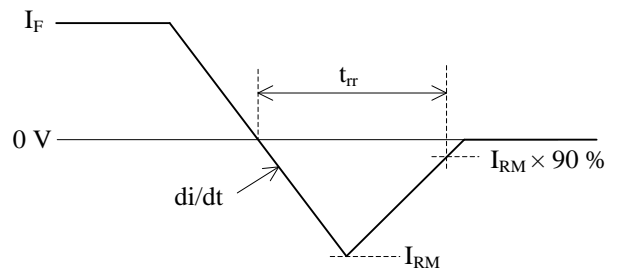


(b) Waveform

Figure 2. Switching Time



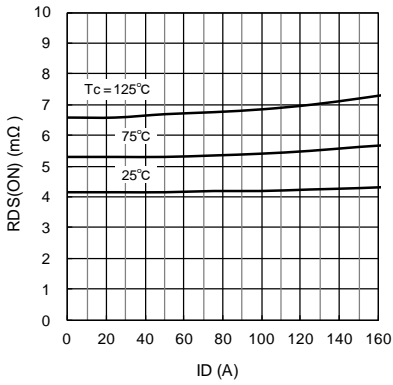
(a) Test Circuit



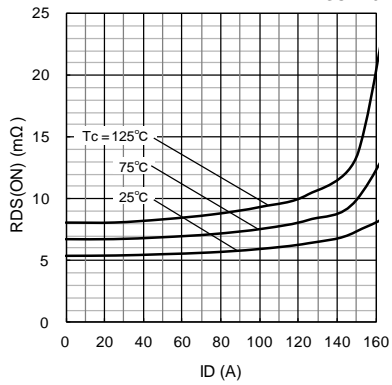
(b) Waveform

Figure 3. Diode Reverse Recovery Time

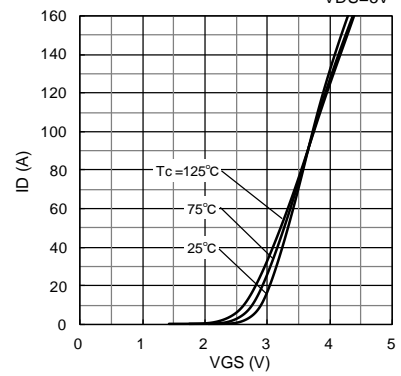
RDS(ON)-ID characteristics (typical)
VGS=10V



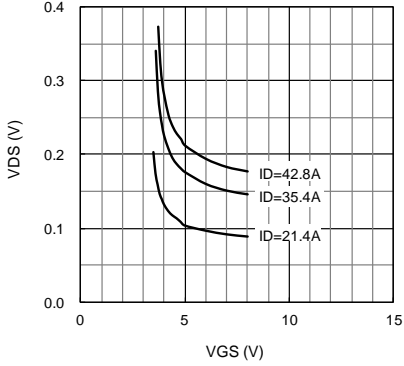
RDS(ON)-ID characteristics (typical)
VGS=4.5V



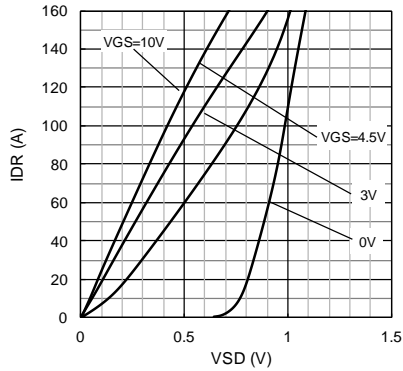
ID-VGS characteristics (typical)
VDS=5V



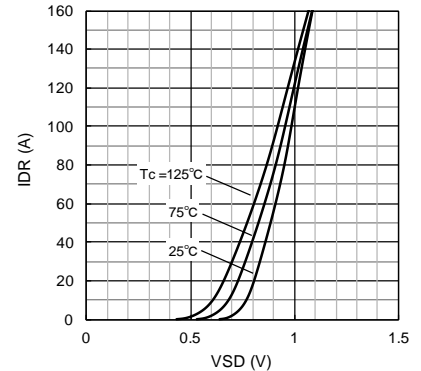
VDS-VGS characteristics (typical)
Tc=25°C



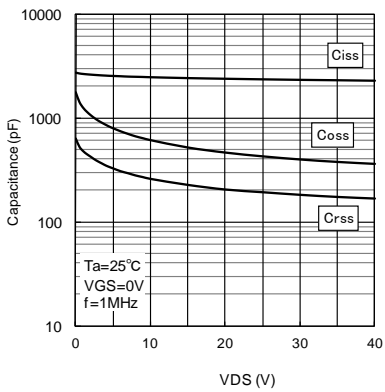
IDR-VSD characteristics (typical)
Tc=25°C



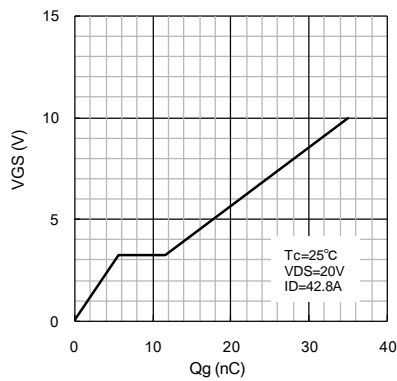
IDR-VSD characteristics (typical)
VDS=0V



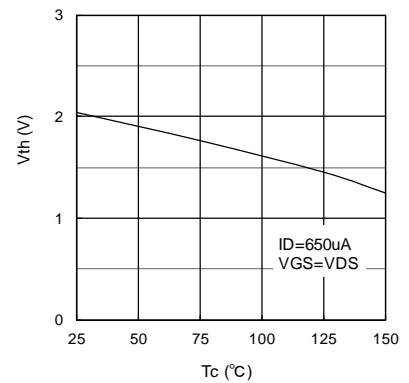
Capacitance-VDS characteristics (typical)



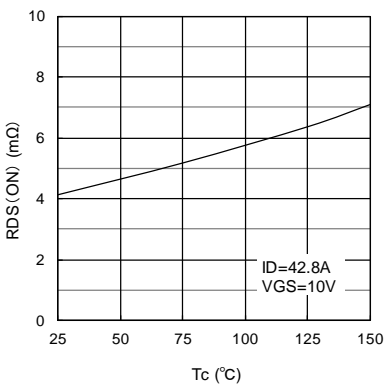
VGS - Qg characteristics (typical)



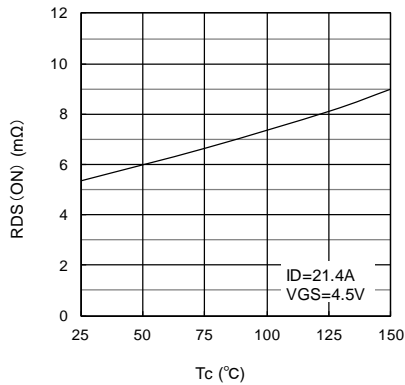
Vth-Tc characteristics (typical)



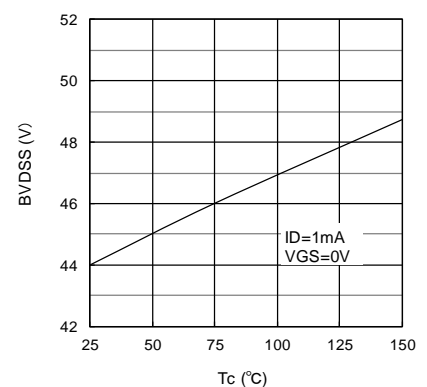
RDS(ON)-Tc characteristics (typical)



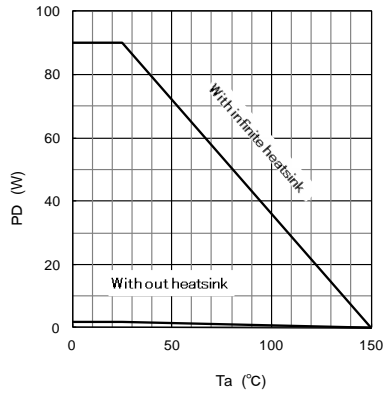
RDS(ON)-Tc characteristics (typical)



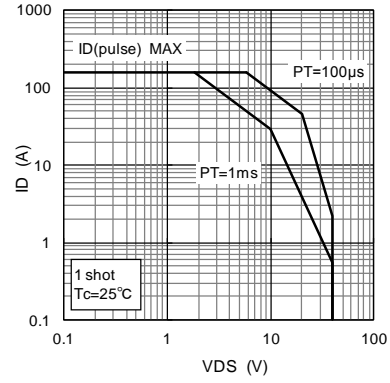
BVDSS-Tc characteristics (typical)



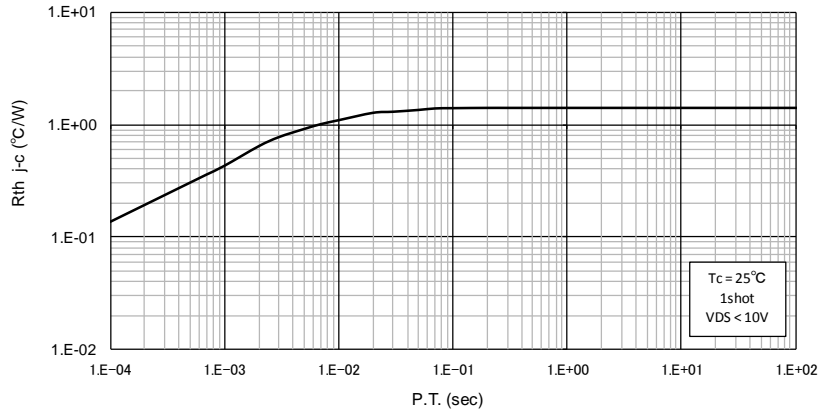
PD-Ta Derating



SAFE OPERATING AREA



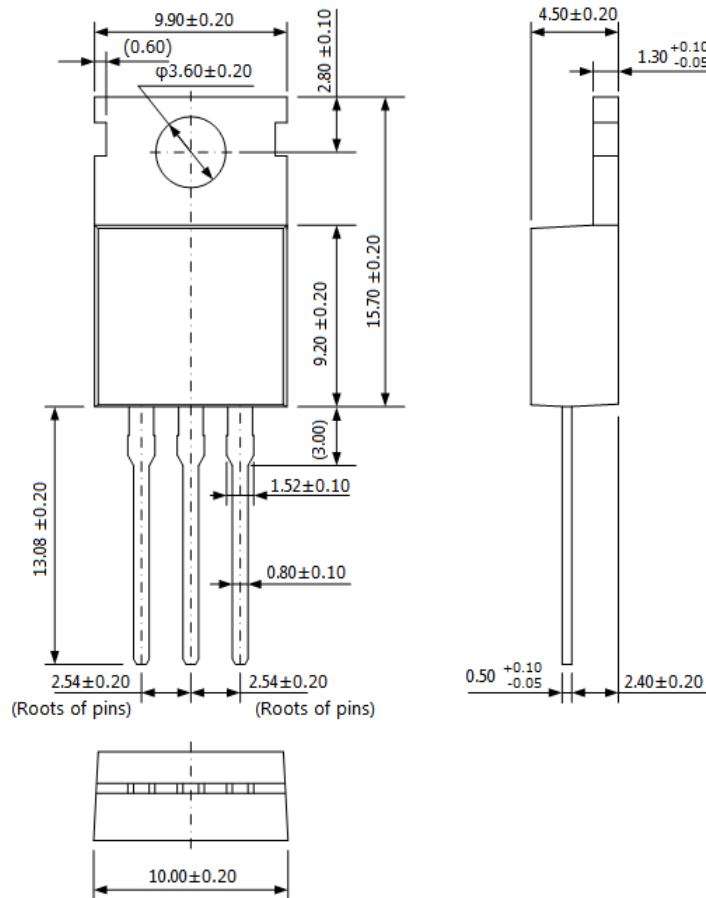
TRANSIENT THERMAL RESISTANCE - PULSE WIDTH



EKI04047

Physical Dimensions

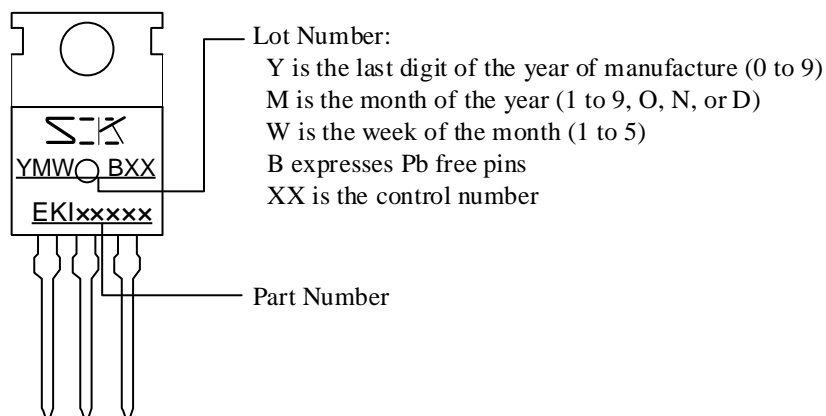
- TO220-3L



NOTES:

- Dimensions in millimeters
- Maximum gate burr height is 0.3 mm.
- Bare lead frame: Pb-free (RoHS compliant)
- When soldering the products, it is required to minimize the working time, within the following limits:
 - Flow: 260 ± 5 °C / 10 ± 1 s, 2 times
 - Soldering Iron: 380 ± 10 °C / 3.5 ± 0.5 s, 1 time
- Soldering should be at a distance of at least 1.5 mm from the body of the product.
- Recommended screw torque for TO220: 0.490 N·m to 0.686 N·m (5 kgf·cm to 7 kgf·cm)

Marking Diagram



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