

Features

- Ultra-fast body diode
- Very low FOM $R_{DS(on)} \times Q_g$
- Easy to use/drive

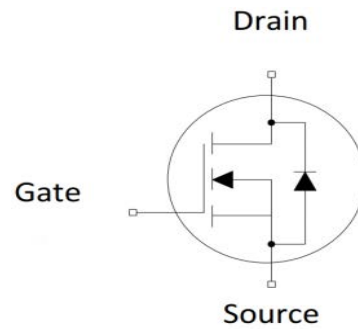
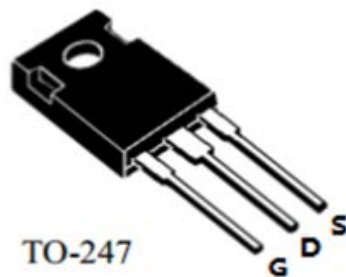
Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- LLC Half-bridge
- Charger

Product Summary

V_{DS}	650V
$R_{DS(on)}$ typ.	44m Ω
I_D	72A

100% DVDS Tested
100% Avalanche Tested



Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	700	V
$R_{DS(on),max}$	0.044	Ω
$Q_{g,typ}$	165	nC
I_D	72	A
$I_{D,pulse}$	216	A
$E_{OSS} @ 400V$	19.49	μJ
Body Diode di_f/dt	500	A/ μs
t_{rr}	242	ns
Q_{rr}	1.5	μC
I_{rrm}	12	A

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted				
Parameter		Symbol	Value	Unit
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	72	A
	$T_C = 100^\circ\text{C}$		43.2	
Pulsed Drain Current	(note1)	$I_{D,pulse}$	216	A
Gate-Source Voltage		V_{GSS}	± 30	V
Single Pulse Avalanche Energy	(note2)	E_{AS}	2185	mJ
Repetitive Avalanche Energy	(note2)	E_{AR}	3.31	mJ
Avalanche Current		I_{AR}	13.7	A
MOSFET dv/dt Ruggedness, $V_{DS} = 0 \dots 480\text{V}$		dv/dt	50	V/ns
Power Dissipation For TO-247		P_D	500	W
Continuous Diode Forward Current		I_S	61	A
Diode Pulsed Current	(note1)	$I_{S,pulse}$	216	
Reverse Diode dv/dt	(note3)	dv/dt	50	V/ns
Maximum Diode Commutation Speed	(note3)	di_f/dt	900	A/ μs
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	$^\circ\text{C}$

Thermal Resistance For TO-247			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	0.25	$^\circ\text{C} / \text{W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	

Electrical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu\text{A}$	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	5	μA
		$V_{DS} = 650V, V_{GS} = 0V, T_J = 150^\circ\text{C}$	--	--	10000	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	3	4	5	V
Drain-Source On-State-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 36A$	--	0.037	0.044	Ω
Gate Resistance	R_G	$f = 1.0\text{MHz}$ open drain	--	0.3	--	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 100V,$ $f = 1.0\text{MHz}$	--	7837	--	pF
Output Capacitance	C_{oss}		--	221	--	
Reverse Transfer Capacitance	C_{rss}		--	13.2	--	
Total Gate Charge	Q_g	$V_{DD} = 520V, I_D = 50A,$ $V_{GS} = 10V$	--	165	--	nC
Gate-Source Charge	Q_{gs}		--	50	--	
Gate-Drain Charge	Q_{gd}		--	70	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 50A,$ $R_G = 25\Omega$	--	103	--	ns
Turn-on Rise Time	t_r		--	83	--	
Turn-off Delay Time	$t_{d(off)}$		--	543	--	
Turn-off Fall Time	t_f		--	93	--	
Drain-Source Body Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 36A, V_{GS} = 0V$	--	1.0	1.5	V
Reverse Recovery Time	t_{rr}	$V_R = 400V, I_F = 36A,$ $di_F/dt = 100A/\mu\text{s}$	--	242	--	ns
Reverse Recovery Charge	Q_{rr}		--	1.45	--	μC
Peak Reverse Recovery Current	I_{rrm}		--	12	--	A

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 13.7A, V_{DD} = 50V, R_G = 25\Omega,$ Starting $T_J = 25^\circ\text{C}$
3. Identical low side and high side switch with identical R_G

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

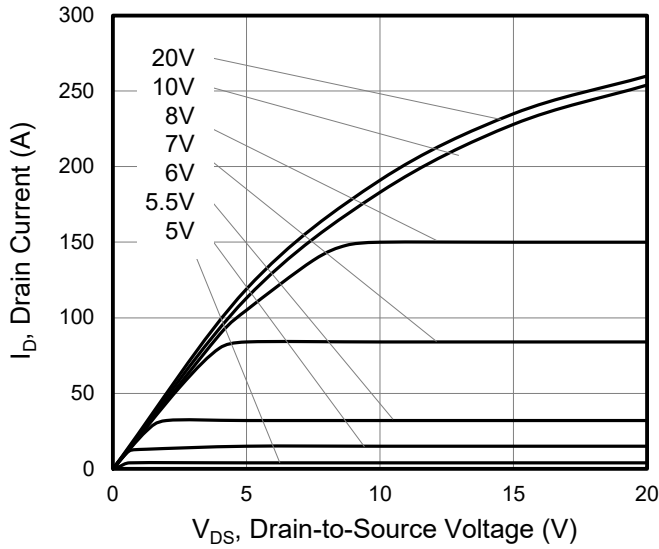


Figure 2. Transfer Characteristics

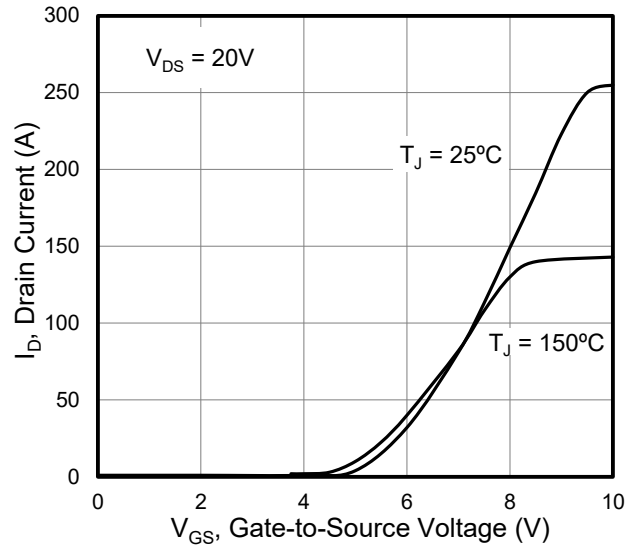


Figure 3. On-Resistance vs. Drain Current

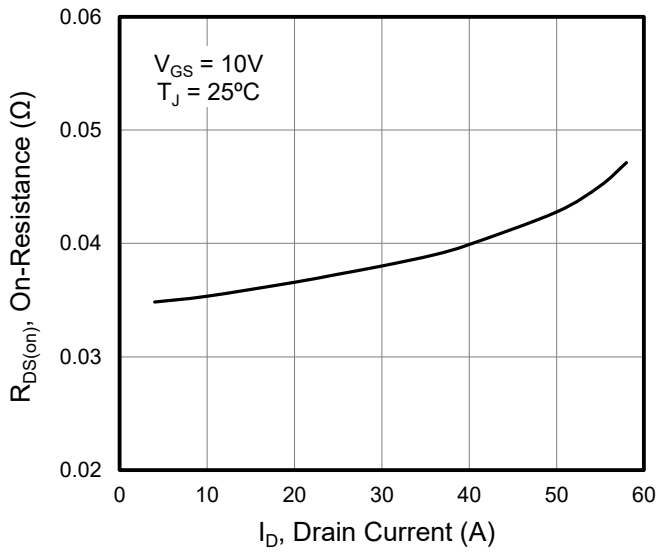


Figure 4. Capacitance

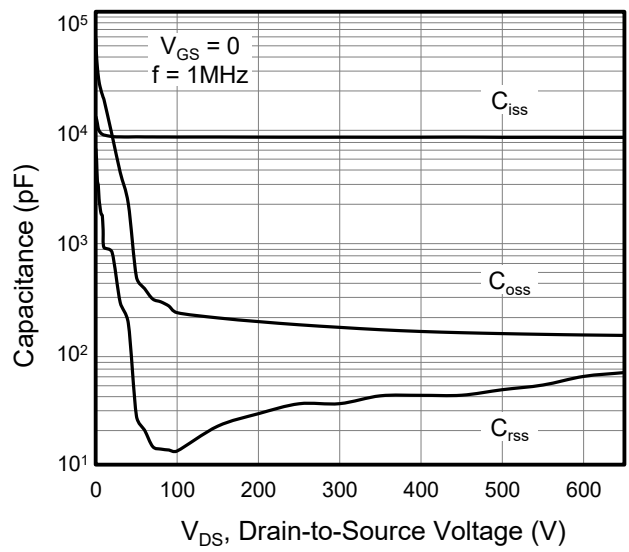


Figure 5. Gate Charge

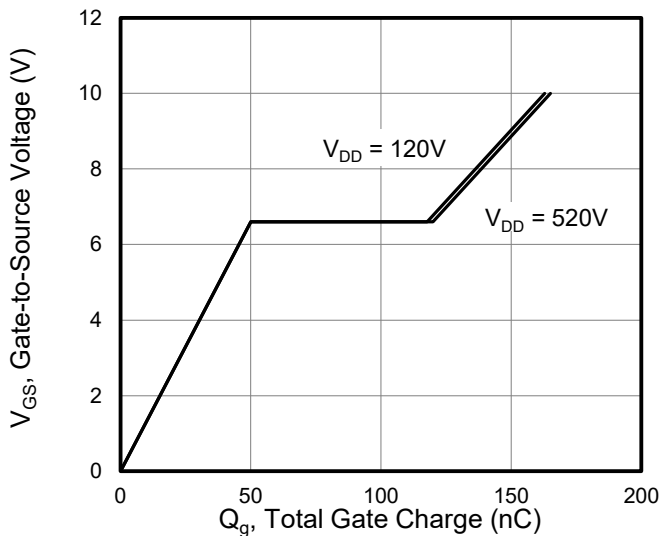
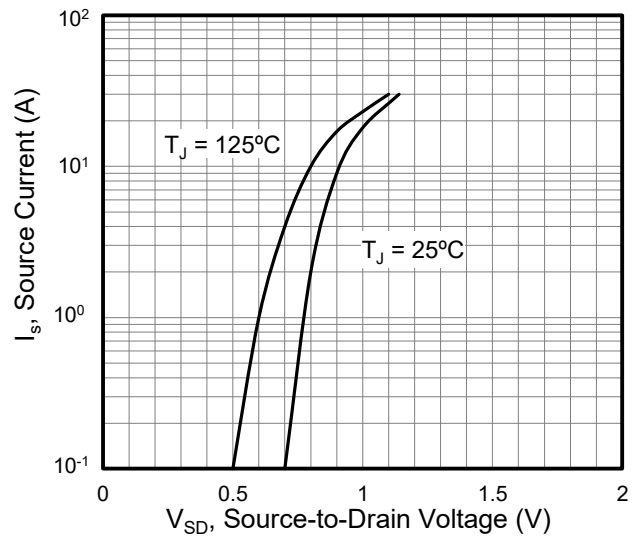


Figure 6. Body Diode Forward Voltage



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

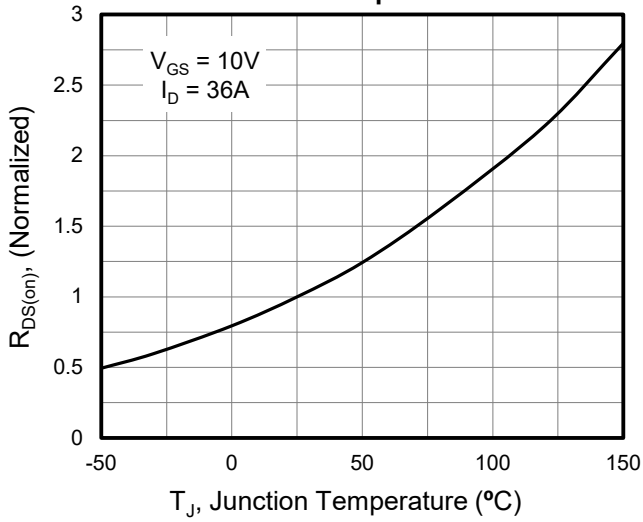


Figure 8. Breakdown voltage vs. Junction Temperature

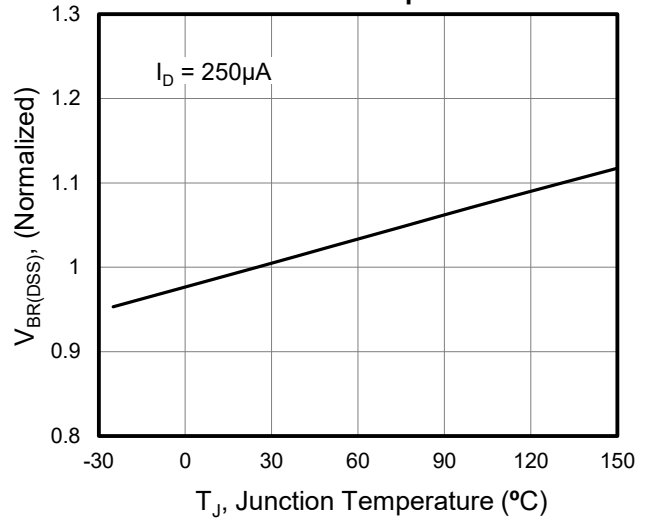


Figure 9. Transient Thermal Impedance For TO-247

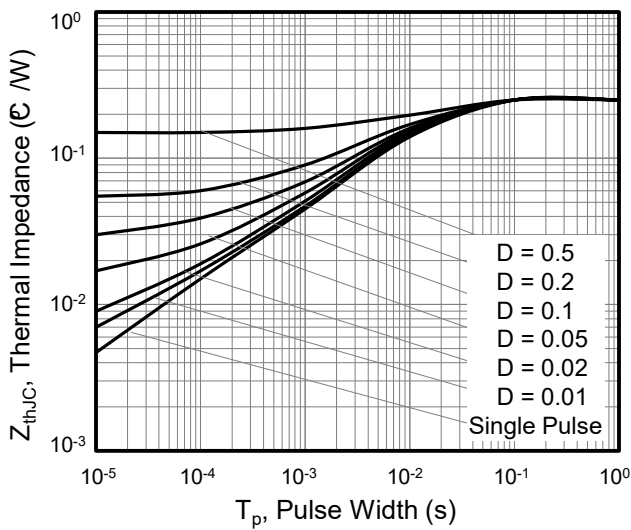


Figure 10. Safe Operation Area For TO-247

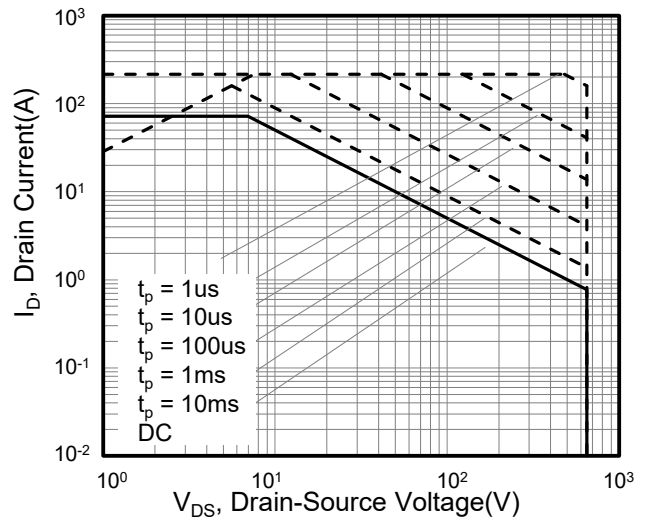


Figure 11. Typ. Coss Stored Energy

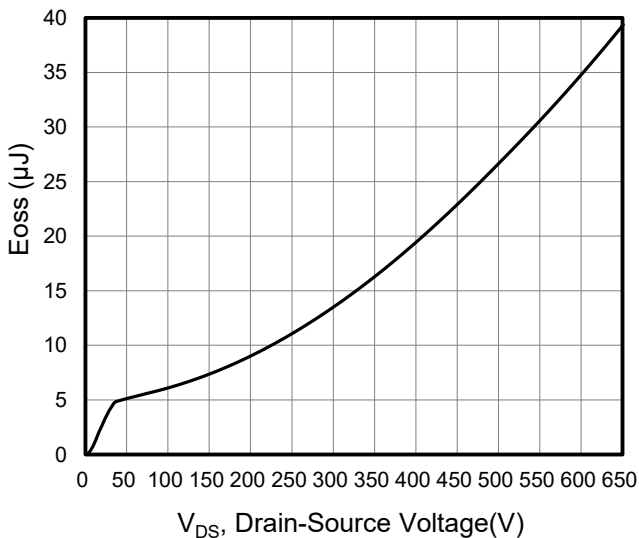


Figure A: Gate Charge Test Circuit and Waveform

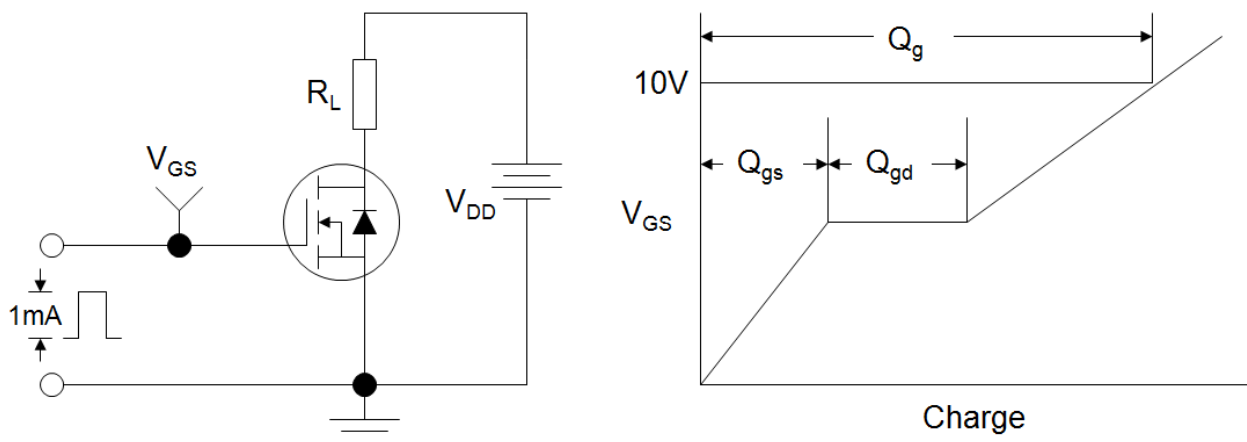


Figure B: Resistive Switching Test Circuit and Waveform

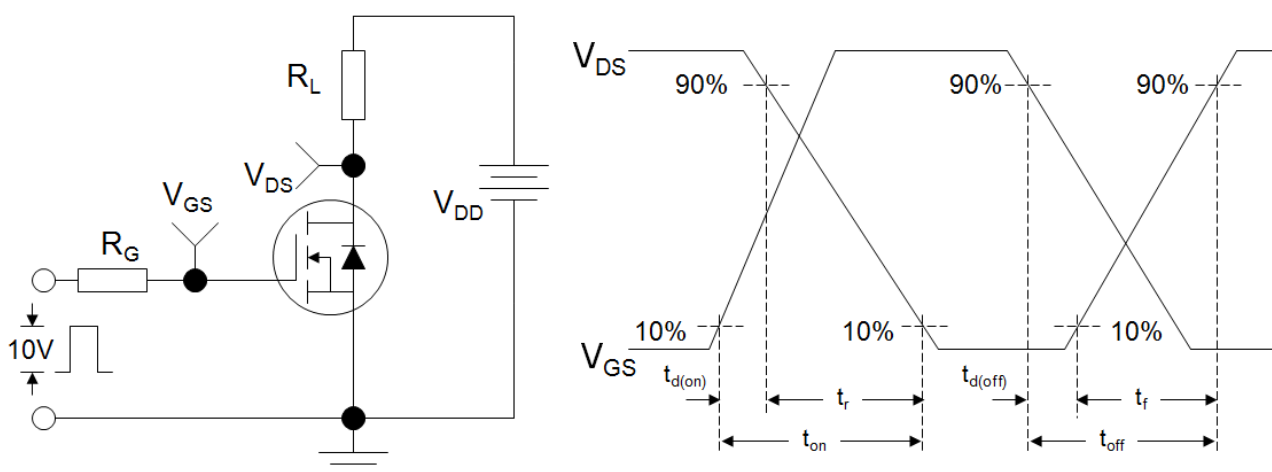
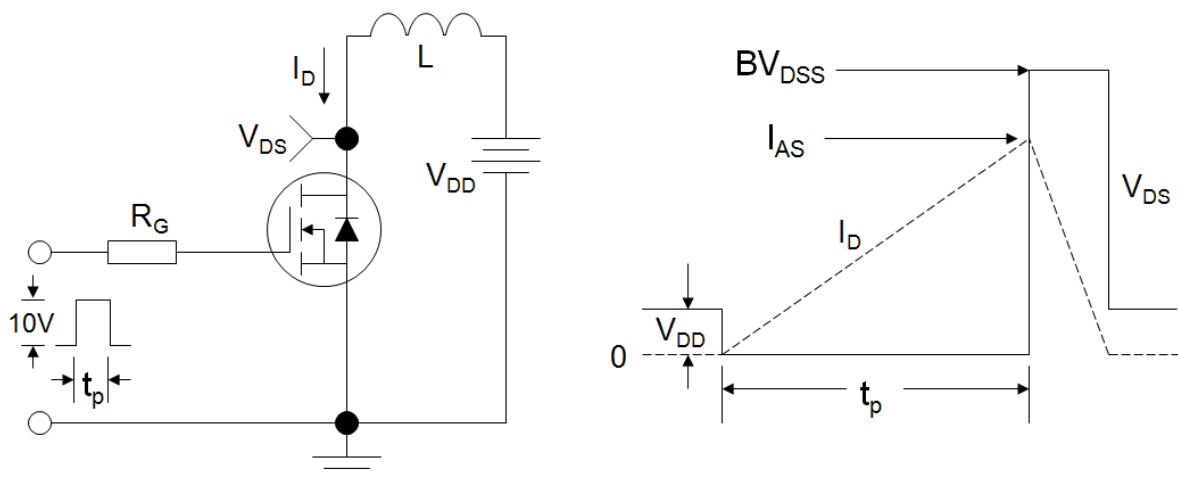
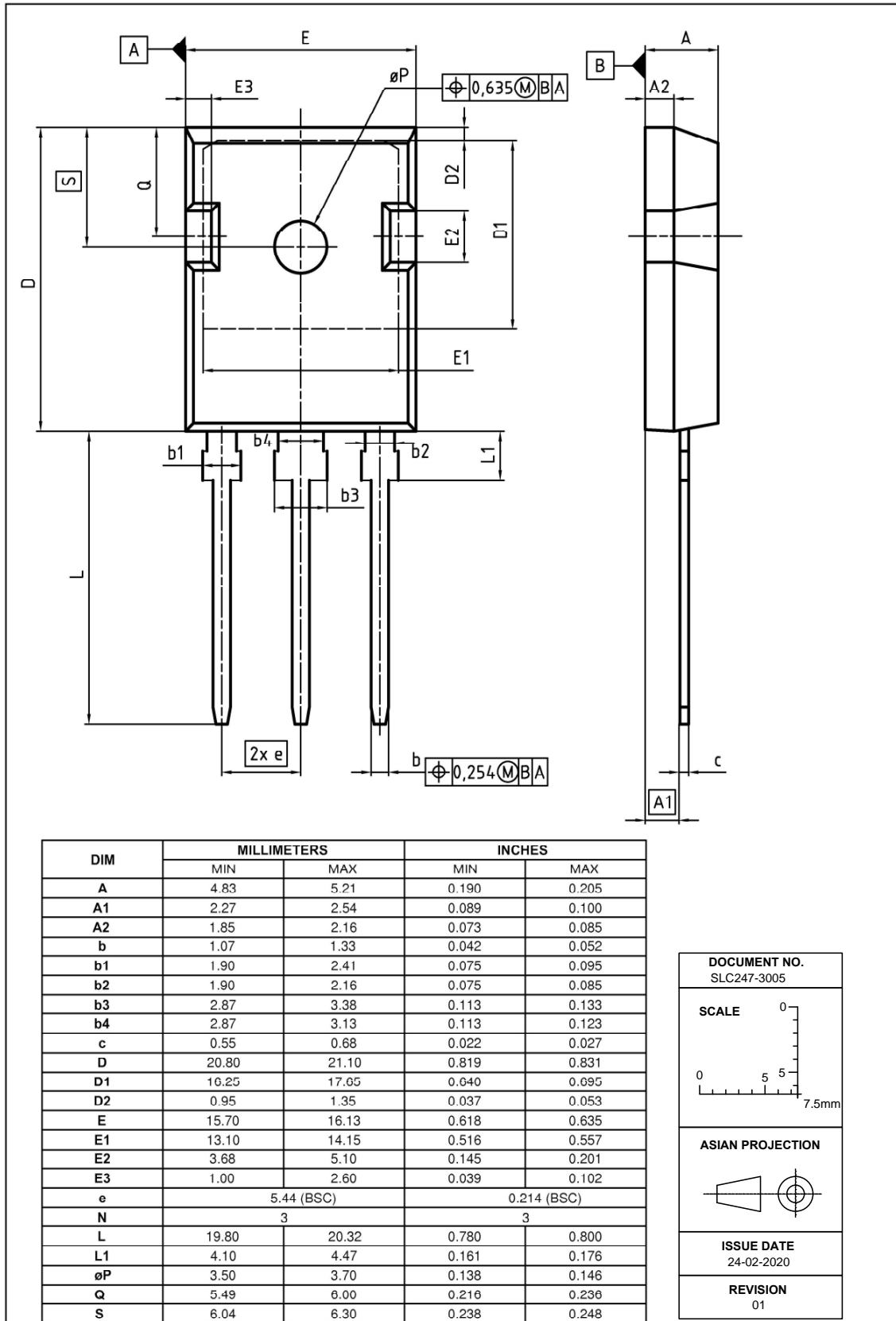


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



PackageOutlines-TO-247



DOCUMENT NO.
SLC247-3005

SCALE

ASIAN PROJECTION

ISSUE DATE
24-02-2020

REVISION
01