

MOSFET Silicon N-Channel MOS



1. Applications

Soft Switching Boost PFC switch, Half bridge or Asymmetric half bridge or Series resonance half bridge and full bridge topologies.
Such as phase-shift-bridge(ZVS),LLC Application-Server Power, Telecom Power, EV Charging, Solar inverter.



2. Features

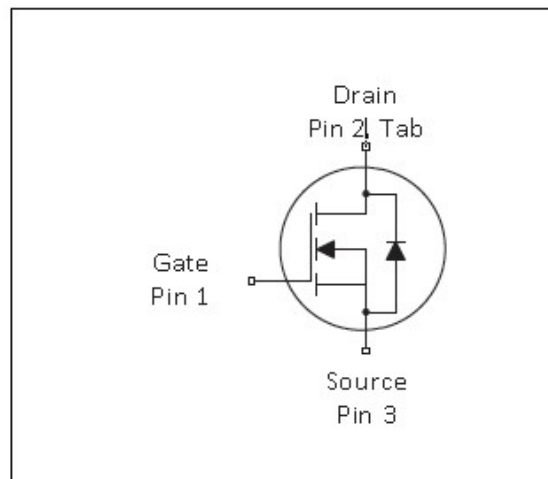
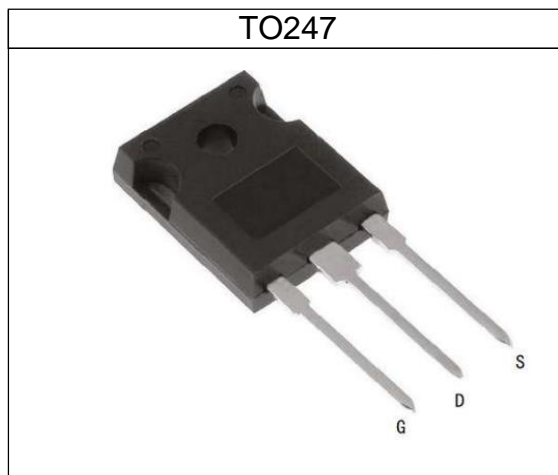
Low drain-source on-resistance: $R_{DS(ON)} = 0.060\Omega$ (typ.)
Easy to control Gate switching
Enhancement mode: $V_{th} = 3$ to 5 V

Table 1 Key Performance Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	700	V
$R_{DS(on),max}$	72	m Ω
$Q_{g,typ}$	93.87	nC
$I_{D,pulse}$	162	A
Body diode dv/dt	50	V/ns

3. Packaging and Internal Circuit

Part Name	Package	Marking
ASW65R072EFDA	TO247	ASW65R072EFDA



1 Maximum ratings

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D		-	54	A	$T_C=25^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	162	A	$T_C=25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	793	mJ	$T_C=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $L=10\text{mH}$, $R_G=25\Omega$
MOSFET dv/dt ruggedness	dv/dt	-	-	36	V/ns	$V_{DS}=0\dots400\text{V}$
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Gate source voltage (dynamic)	V_{GS}	-30	-	30	V	AC ($f>1\text{ Hz}$)
Power dissipation	P_{tot}	-	-	172	W	$T_C=25^\circ\text{C}$
Storage temperature	T_{stg}	-55	-	150	$^\circ\text{C}$	
Operating junction temperature	T_j	-55	-	150	$^\circ\text{C}$	
Reverse diode dv/dt ³⁾	dv/dt	-	-	50	V/s	$V_R=400\text{V}$, $I_F=25\text{ A}$, $di_F/dt=100\text{A}/\mu\text{s}$; see table 8

¹⁾Limited by $T_{j,max}$. Maximum Duty Cycle $D = 0.50$

²⁾Pulse width t_p limited by $T_{j,max}$

³⁾Identical low side and high side switch with identical R_G

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.73	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	°C/W	device on PCB, minimal footprint

3 Electrical characteristics

at $T_j=25^\circ\text{C}$, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	655	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{(GS)th}$	3		5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	2	μA	$V_{DS}=650V, V_{GS}=0V, T_j=25^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	-	100	nA	$V_{GS}=30V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.060	0.072	Ω	$V_{GS}=10V, I_D=14A, T_j=25^\circ\text{C}$
Gate resistance	R_G	-	1	-	Ω	$f=1\text{MHz}$, open drain

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	4528	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$
Output capacitance	C_{oss}	-	414.3	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$
Reverse transfer capacitance	C_{riss}		3.08		pF	$V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	-	21.6	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=17.1A, R_G=5.3\Omega$; see table 9
Rise time	t_r	-	10.7	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=17.1A, R_G=5.3\Omega$; see table 9
Turn-off delay time	$t_{d(off)}$	-	86.6	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=17.1A, R_G=5.3\Omega$; see table 9
Fall time	t_f	-	8.6	-	ns	$V_{DD}=400V, V_{GS}=13V, I_D=17.1A, R_G=5.3\Omega$; see table 9

Table 6 Gate charge characteristics

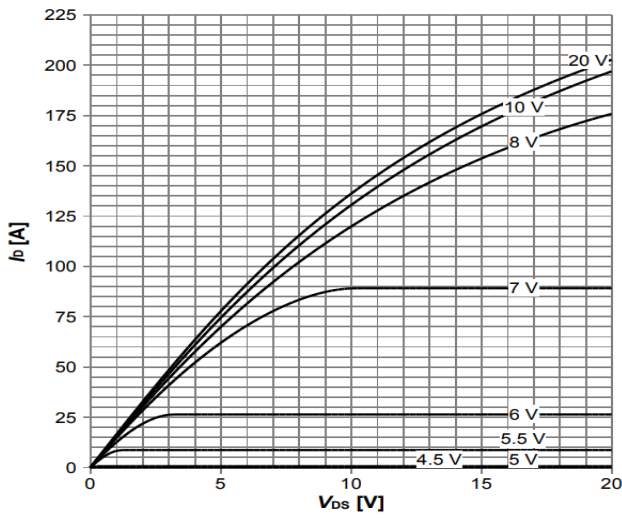
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	24.79	-	nC	$V_{DD}=400V, I_D=17.1A, V_{GS}=0$ to 10V
Gate to drain charge	Q_{gd}	-	34.94	-	nC	$V_{DD}=400V, I_D=17.1A, V_{GS}=0$ to 10V
Gate charge total	Q_g	-	93.87	-	nC	$V_{DD}=400V, I_D=17.1A, V_{GS}=0$ to 10V
Gate plateau voltage	$V_{plateau}$	-	6.01	-	V	$V_{DD}=400V, I_D=17.1A, V_{GS}=0$ to 10V

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.64	-	V	$V_{GS}=0V, I_F=1A, T_j=25^{\circ}C$
Reverse recovery time	t_{rr}	-	224.4	-	ns	$V_R=400V, I_F=33A, di_F/dt=60A/\mu s$; see table 8
Reverse recovery charge	Q_{rr}	-	1.09	-	μC	$V_R=400V, I_F=33A, di_F/dt=60A/\mu s$; see table 8
Peak reverse recovery current	I_{rrm}	-	8.89	-	A	$V_R=400V, I_F=33A, di_F/dt=60A/\mu s$; see table 8

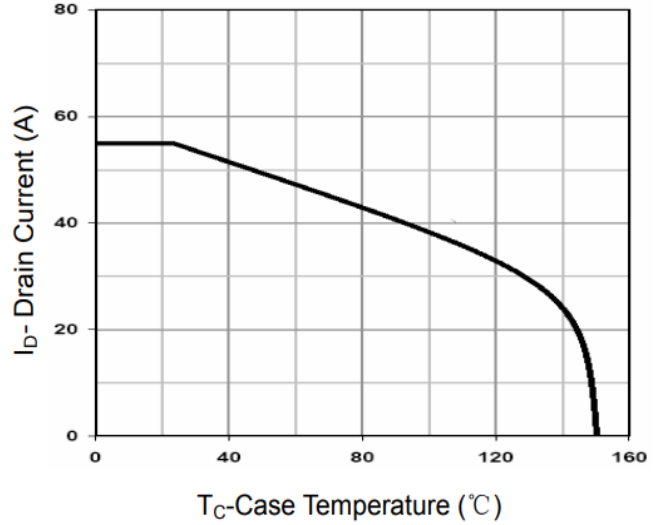
4 Electrical characteristics diagram

Diagram 1: Typ. Output characteristics



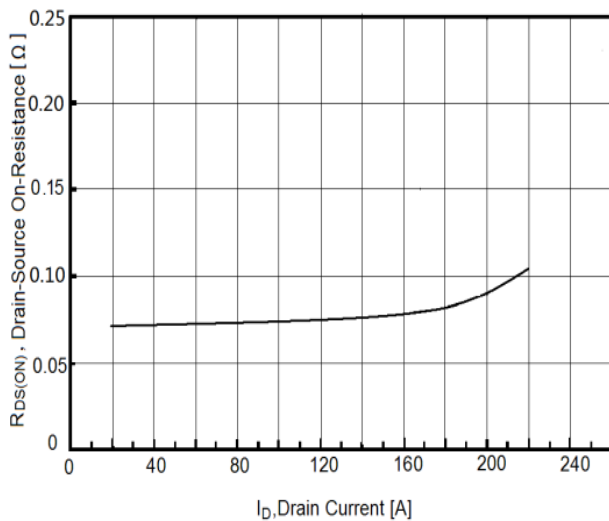
$I_D = f(V_{DS}); T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 2: Typ. Drain Current De-rating



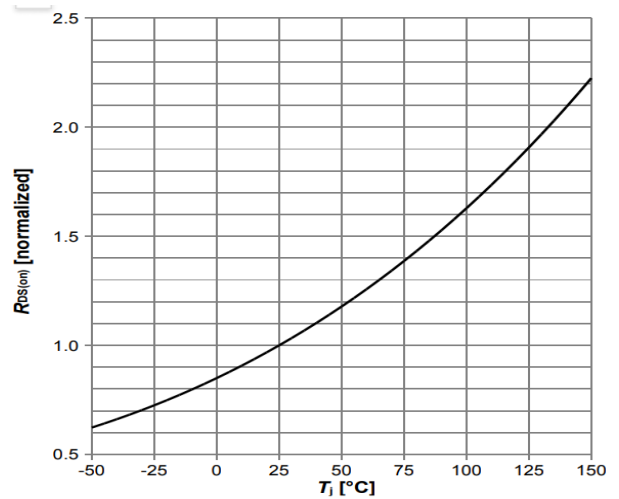
$I_D = f(T_C)$

Diagram 3: Typ. Rdson vs. Drain Current



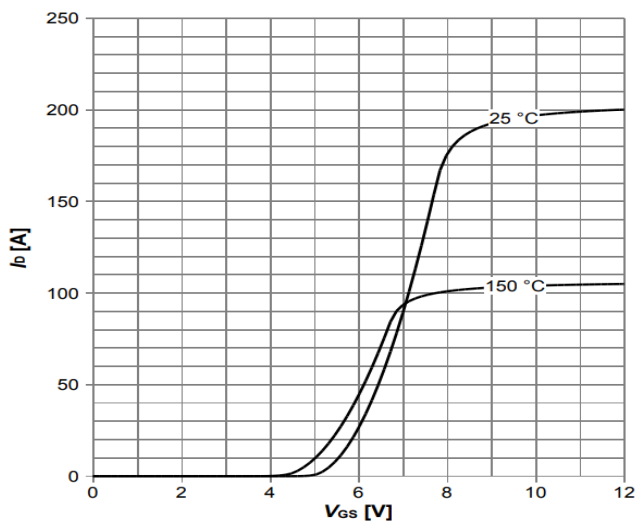
$R_{DS(on)} = f(I_D); V_{GS} = 10V$

Diagram 4: Typ. Rdson – Junction Temperature



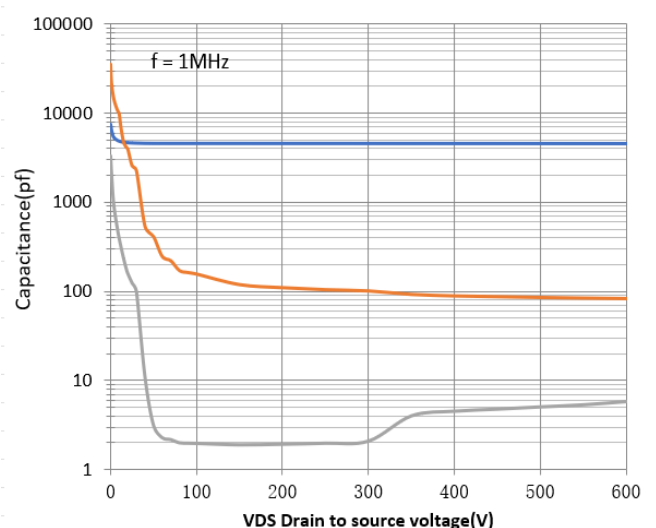
$R_{DS(on)} = f(T_j); V_{GS} = 10V / I_D = 14A$

Diagram 5: Typ. transfer characteristics



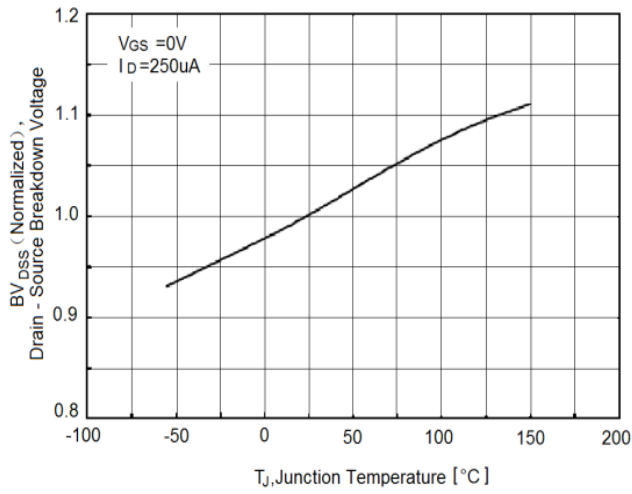
$I_D = f(V_{GS}); T_j = 25^\circ\text{C}; \text{parameter: } V_{DS}$

Diagram 6: Typ. Capacitance vs. Vds



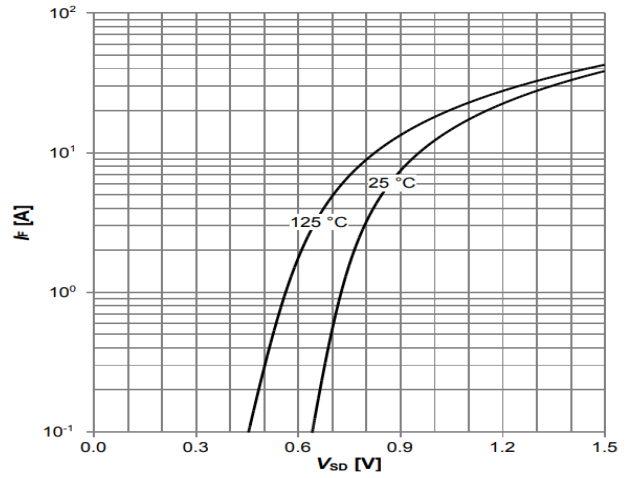
$C = f(V_{DS}); V_{GS} = 0V; f = 1\text{MHz}$

Diagram 7: Typ. BVDSS voltage vs. Temperature



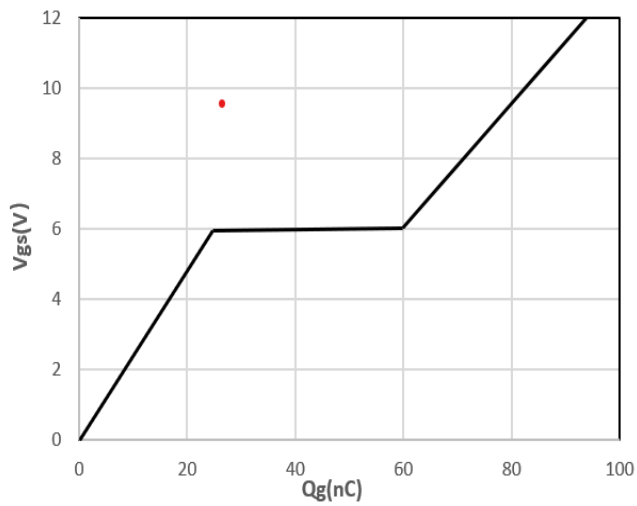
$V_{GS}=f(T_J); I_D=250\mu A$

Diagram 8: Typ. Source-Drain Diode Forward



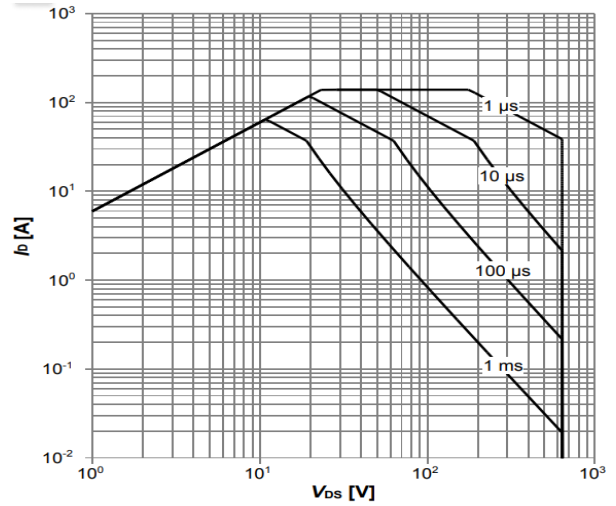
$I_{SD}=f(V_{SD}); T_C=25\text{ }^\circ\text{C};$

Diagram 9: Typ. Gate charge



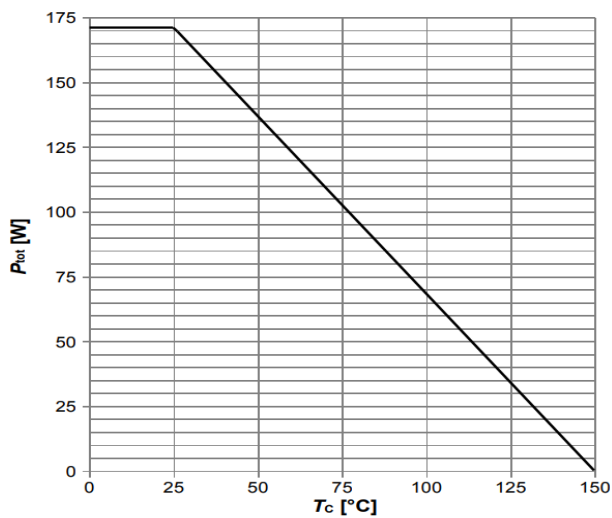
$V_{GS}=f(Q_{gate}); I_D=17.1A\text{ pulsed}; \text{parameter: } V_{DD}$

Diagram 10: Typ. Maximum Safe Operating Area



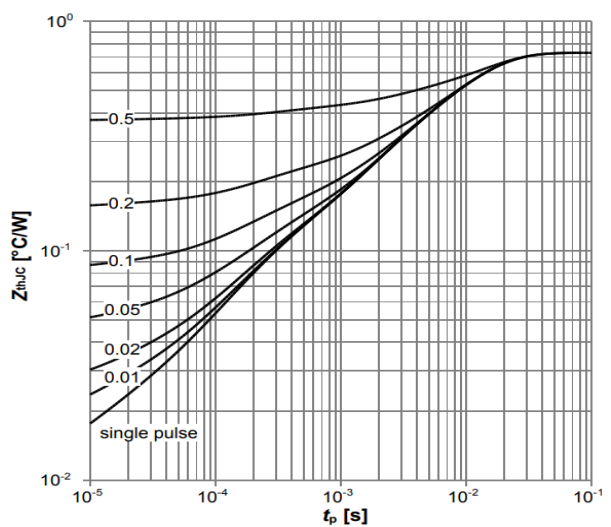
$I_D=f(V_{DS}); T_C=25\text{ }^\circ\text{C}; V_{GS}>7V; D=0; \text{parameter } t_p$

Diagram 11: Typ. Power Dissipation



$P_{tot}=f(T_C);$

Diagram 12: Normalized Transient Impedance



5 Test Circuits

Table 8 Diode characteristics

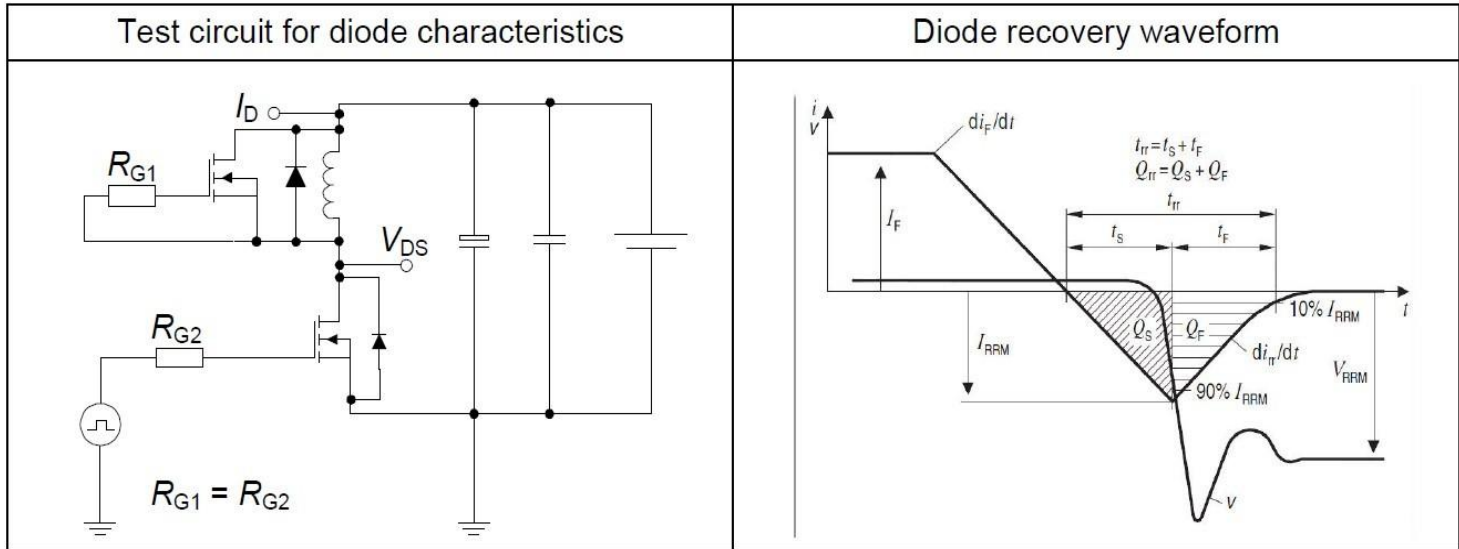


Table 9 Switching times

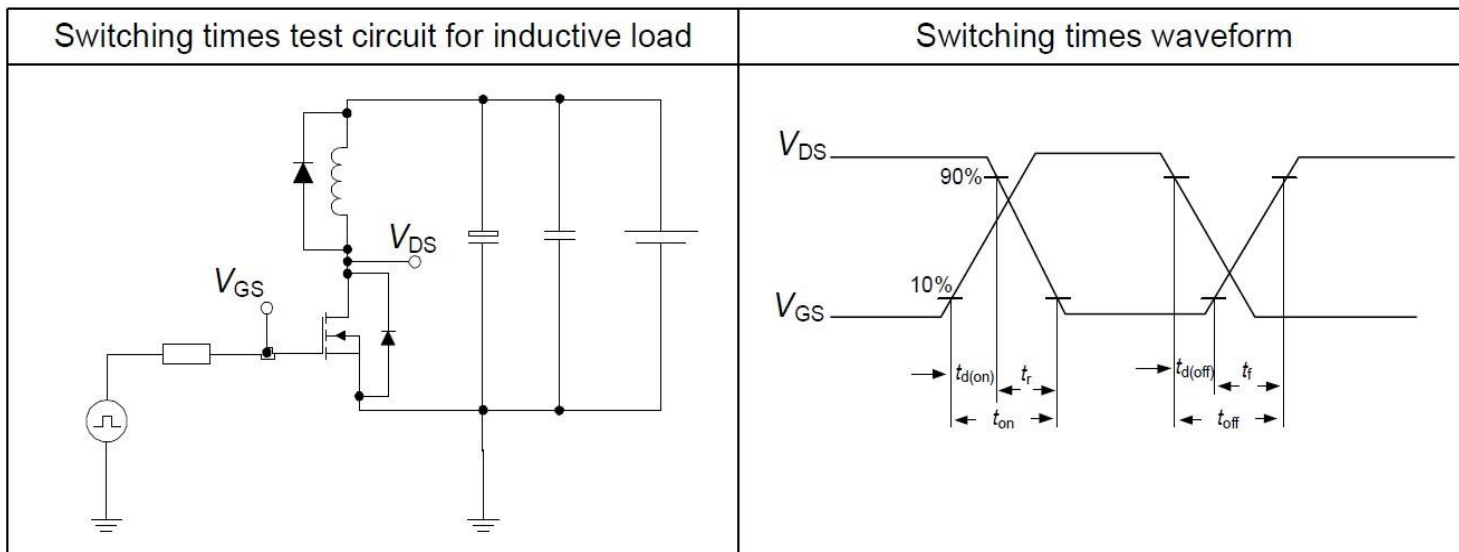
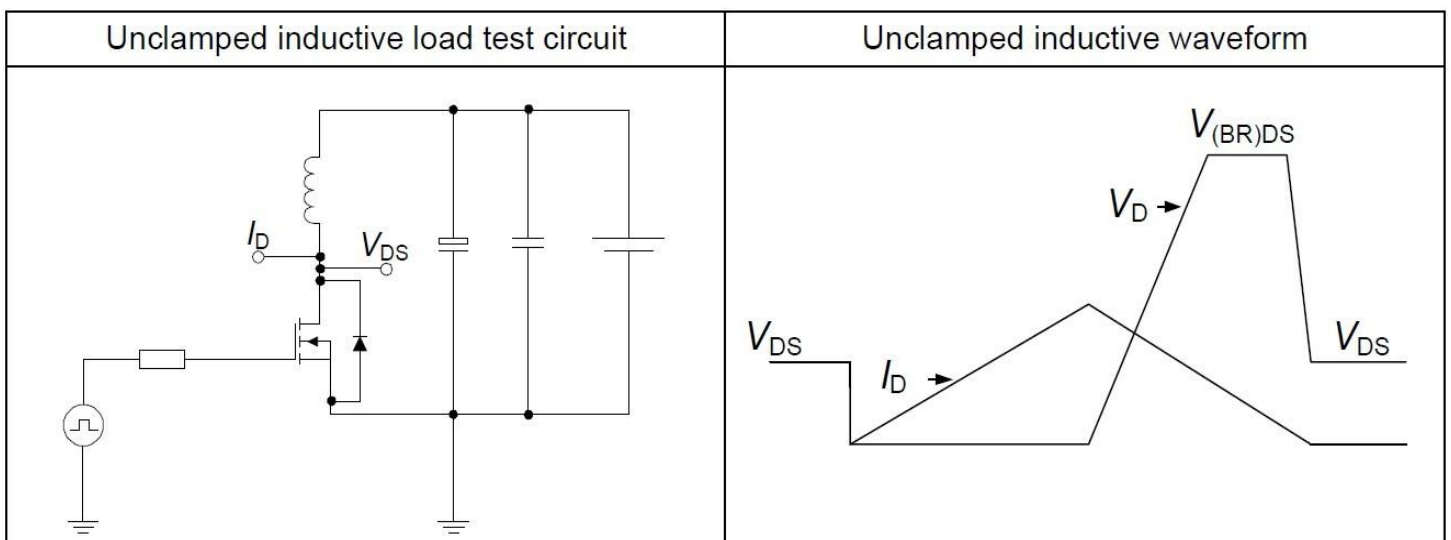


Table 10 Unclamped inductive load



6 Package Outlines

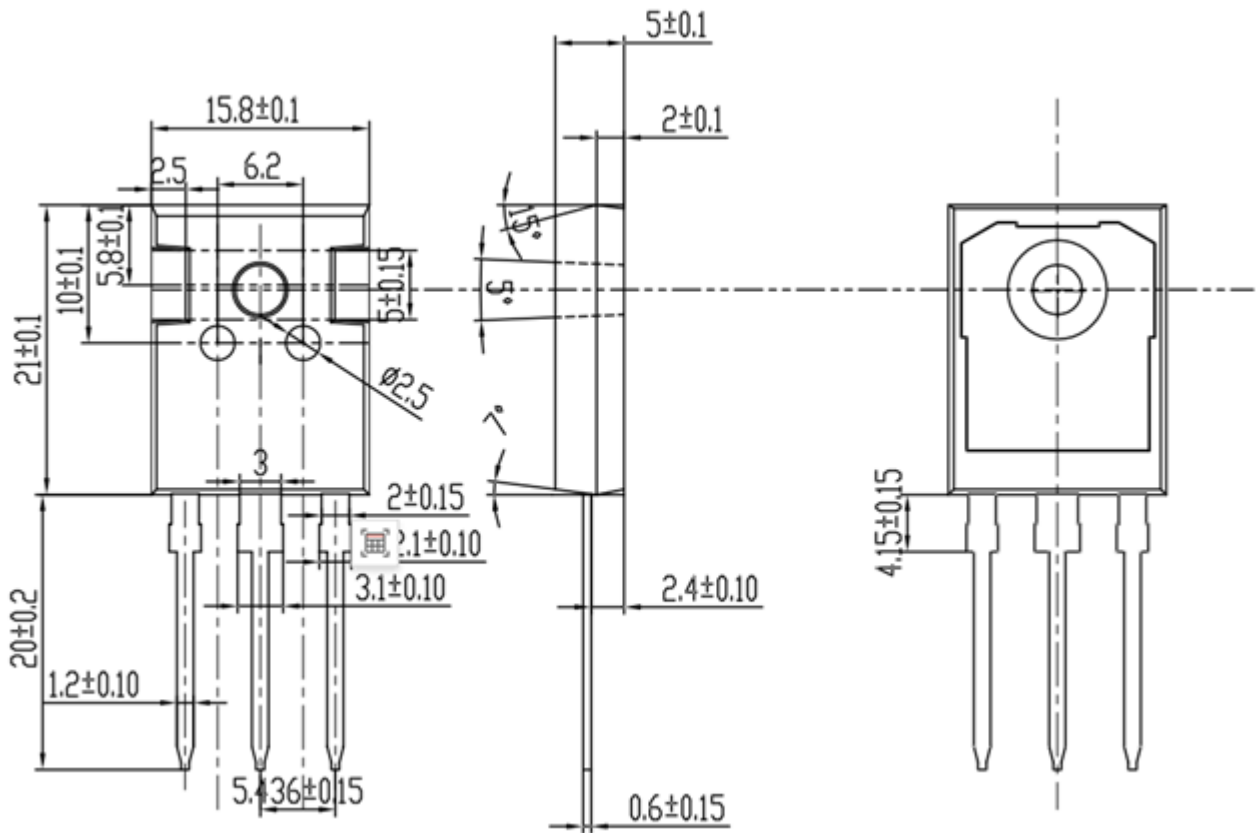


Figure: Outline PG-TO247(HT)

Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2023-07-25	Preliminary version

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