



30A 650V N-CHANNEL POWER MOSFET

Description

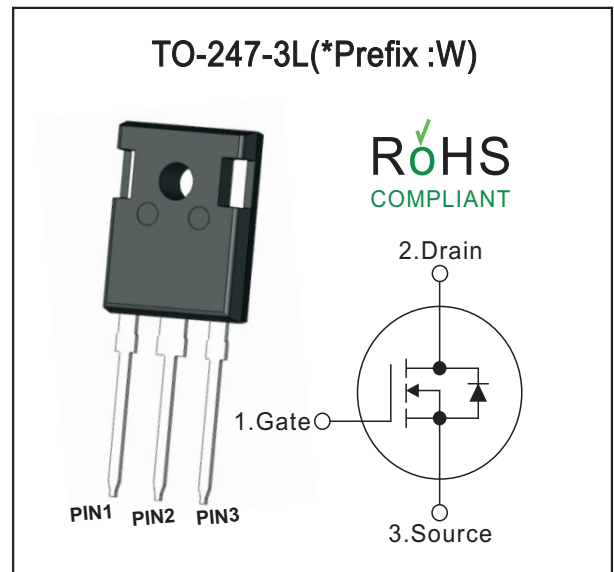
The power MOSFET using **super junction** technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

Features

- $R_{DS(ON)} \leq 110m\Omega @ V_{GS}=10V, I_D=15A$
- Fast switching capability
- Low On-Resistance
- 100% Avalanche tested
- 100% ΔV_{DS} tested

Mechanical data

- Case: TO-247-3L
- Approx Weight: 6.3g (0.22oz)
- RoHS compliant
- Case Material: "Green" molding compound, UL flammability classification 94V-0, "Halogen-free".



Absolute Maximum Ratings (Ta=25°C, Unless Otherwise Specified)

Parameter	Symbols	Ratings	Units
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current $T_c=25^\circ C$	I_D	30	A
Pulsed Drain Current (Note 2)	I_{DM}	120	A
Avalanche Energy Single Pulsed (Note 3)	E_{AS}	845	mJ
Power Dissipation ($T_c = 25^\circ C$)	P_D	178	W
Operating junction and storage temperature	T_J, T_{STG}	-55 ~ +150	$^\circ C$

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. $L=10mH, V_{DD}=50V, R_G=25\Omega, \text{Starting } T_J=25^\circ C$

Thermal Resistance

Parameter	Symbols	Ratings	Units
Thermal resistance, junction – case.	R_{thJC}	0.7	$^\circ C/W$
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	62	$^\circ C/W$



Electrical Characteristics (Ta=25°C, Unless Otherwise Specified)

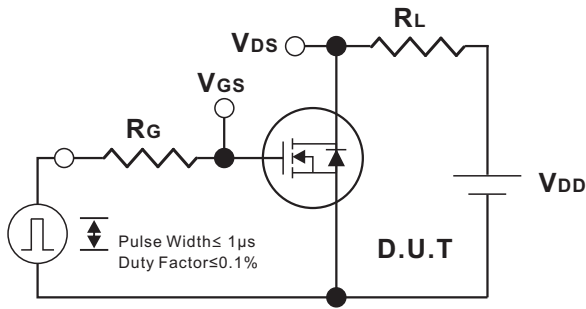
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=15A$		94	110	m Ω
Transconductance	g_{fs}	$V_{DS}=10V, I_D=15A$		20		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=50V,$ $V_{GS}=0V,$ $f=1.0MHz$		2350		pF
Output Capacitance	C_{OSS}			139		pF
Reverse Transfer Capacitance	C_{RSS}			4		pF
Gate resistance	R_G	$V_{DS}=0V, FREQ=1.00MHz$		6.0		Ω
Switching Characteristics						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=480V, V_{GS}=10V,$ $I_D=19.1A$ (NOTE1,2)		118		nC
Gate-Source Charge	Q_{GS}			21		nC
Gate-Drain Charge	Q_{GD}			64		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=400V, I_D=19.1A$ $R_G=1.8\Omega, V_{GS}=13V$ (NOTE1,2)		16		ns
Turn-On Rise Time	t_R			11		ns
Turn-Off Delay Time	$t_{D(OFF)}$			68		ns
Turn-Off Fall Time	t_F			6		ns
Drain-Source Diode Characteristics And Maximum Ratings						
Maximum Body-Diode Continuous Current	I_S				30	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_{SD}=19.1A, V_{GS}=0V$			1.2	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_F=19.1A$ $di/dt=100A/\mu s$		150		ns
Reverse Recovery Charge	Q_{rr}			0.8		μC

Notes:

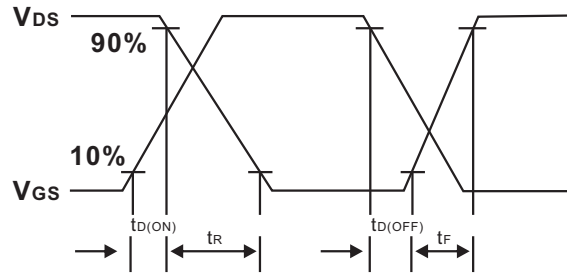
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



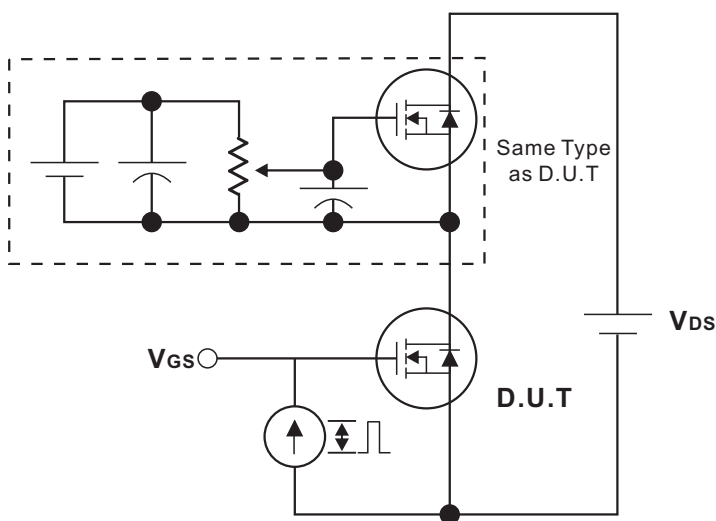
Test Circuits and waveforms



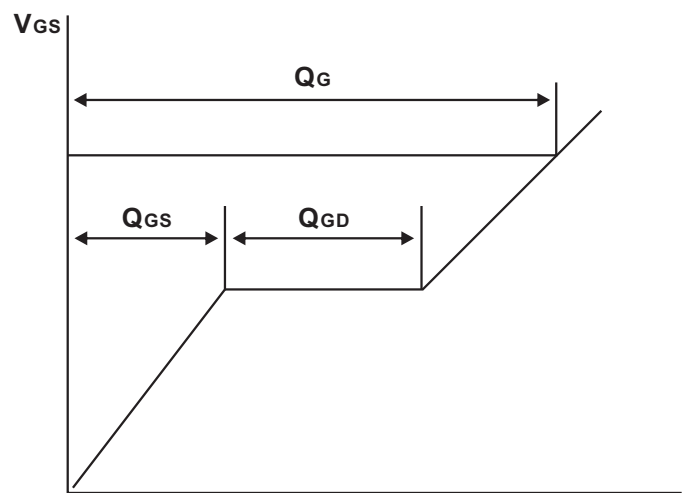
Switching Test Circuit



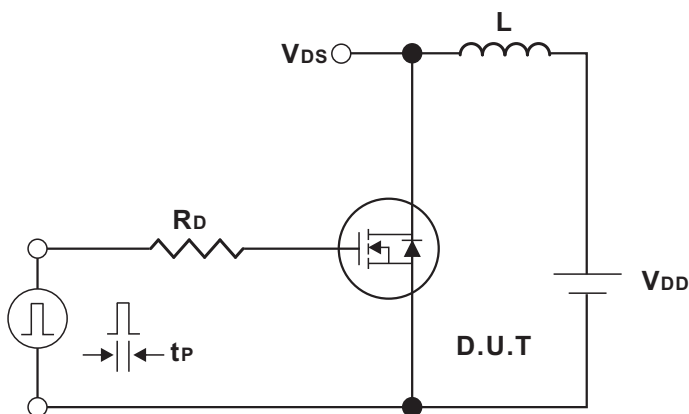
Switching Waveforms



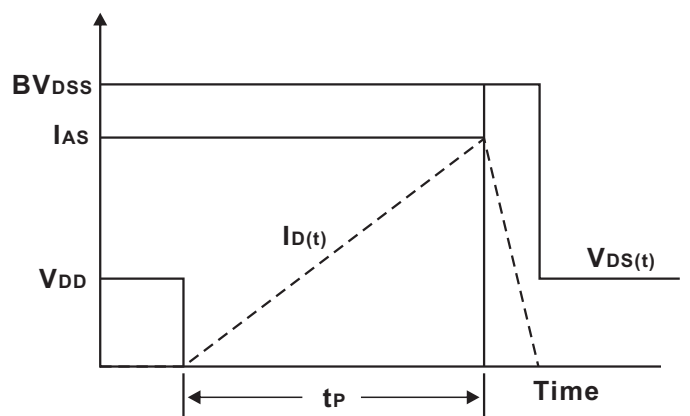
Gate Charge Test Circuit



Charge
Gate Charge Waveform



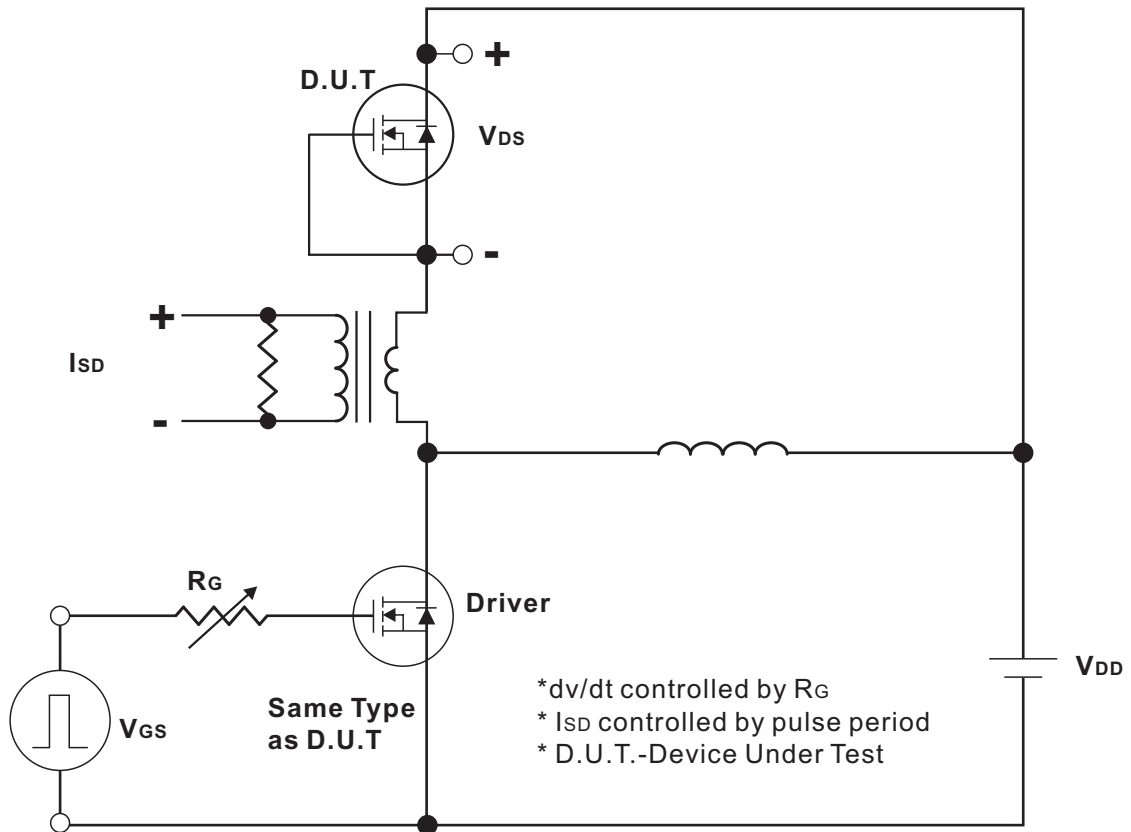
Unclamped Inductive Switching Test Circuit



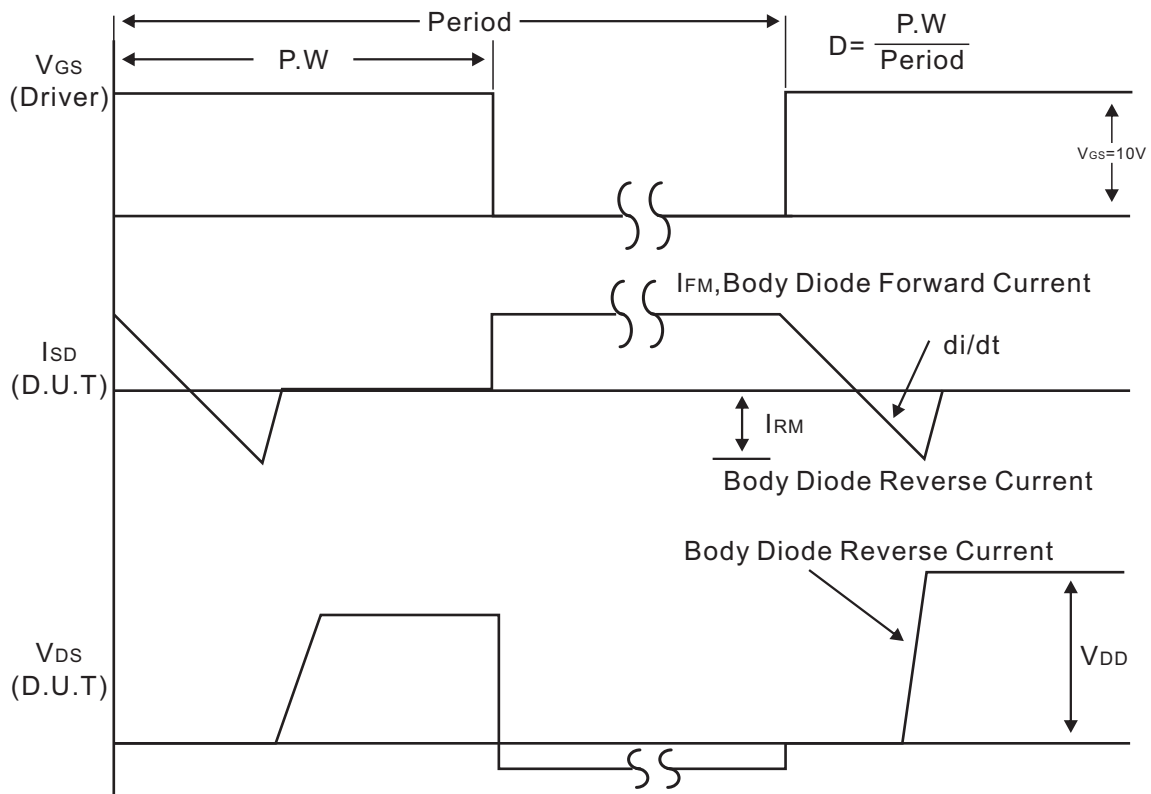
Unclamped Inductive Switching Waveforms



Test Circuits and waveforms



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms



Typical Characteristics

Fig.1 Output characteristics

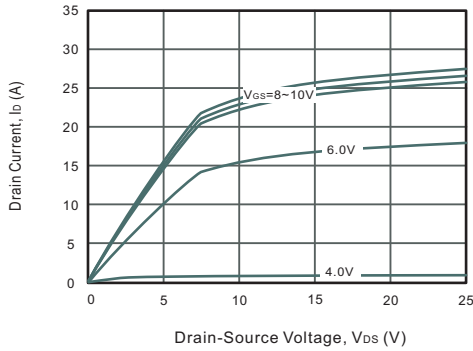


Fig.2 Power Dissipation

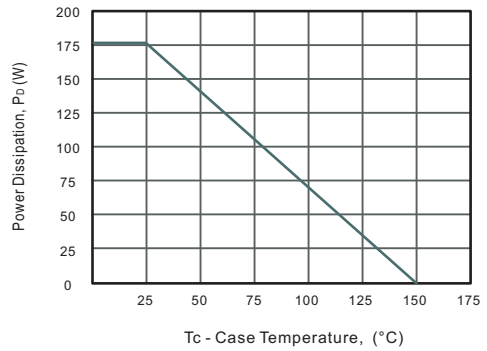


Fig.3 Drain Current Derating

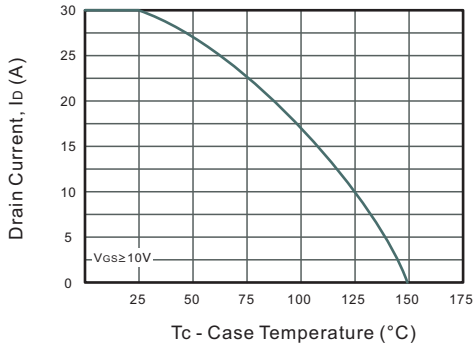


Fig.4 Drain-Source On-Resistance vs. Drain Current

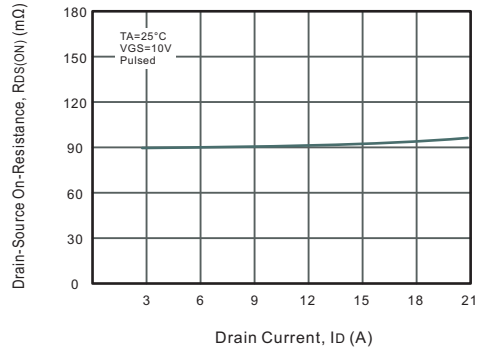


Fig.5 Gate Threshold Voltage vs. Junction Temperature

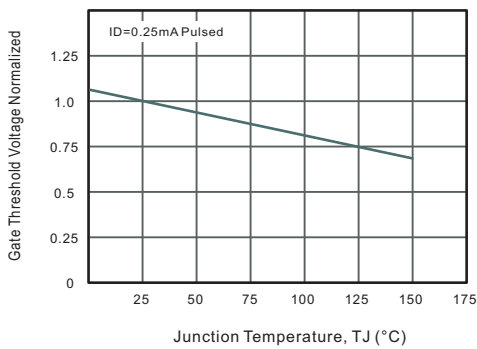


Fig.6 Body-diode Forward Characteristics

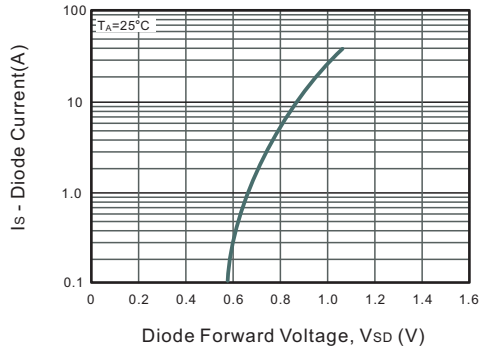


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

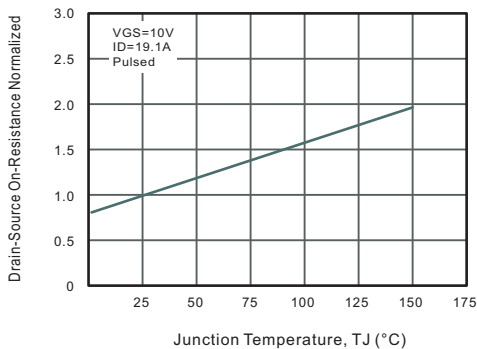
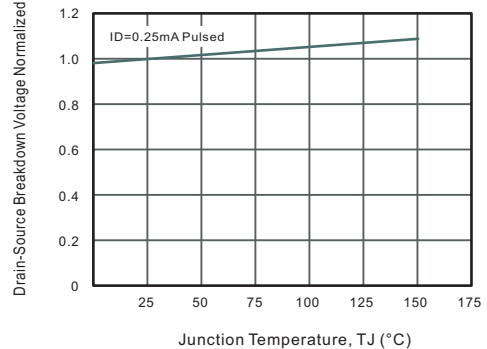


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Capacitance Characteristics

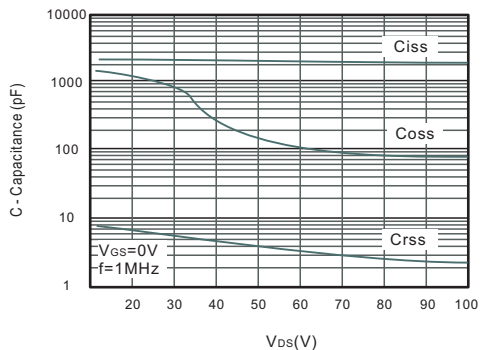


Fig.10 Gate Charge Characteristics

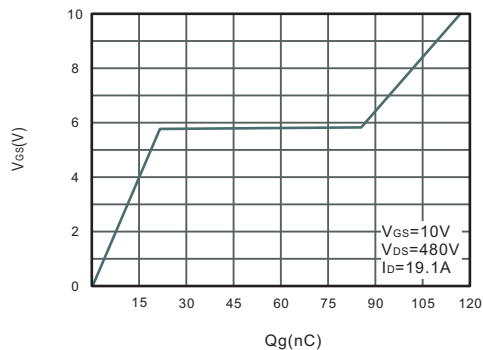


Fig.11 Safe Operating Area

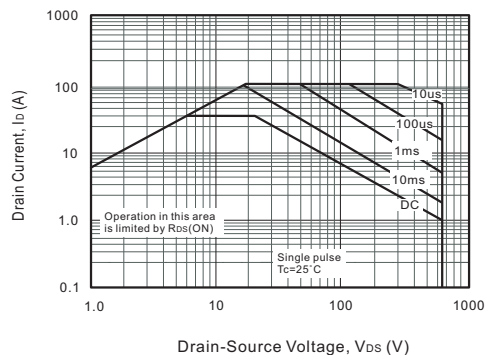
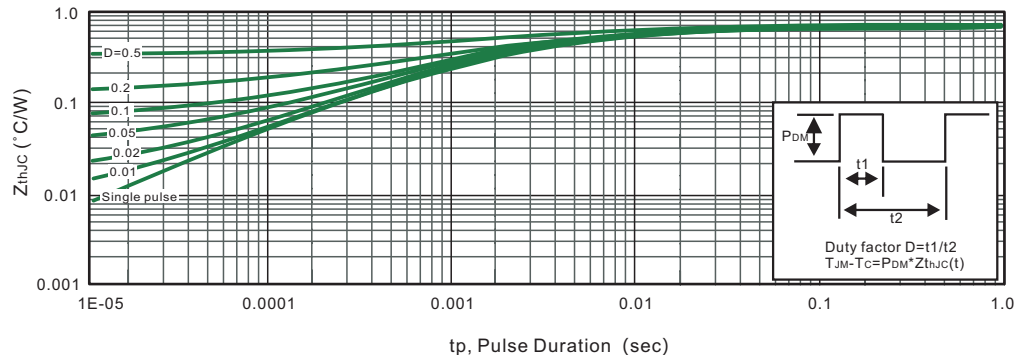


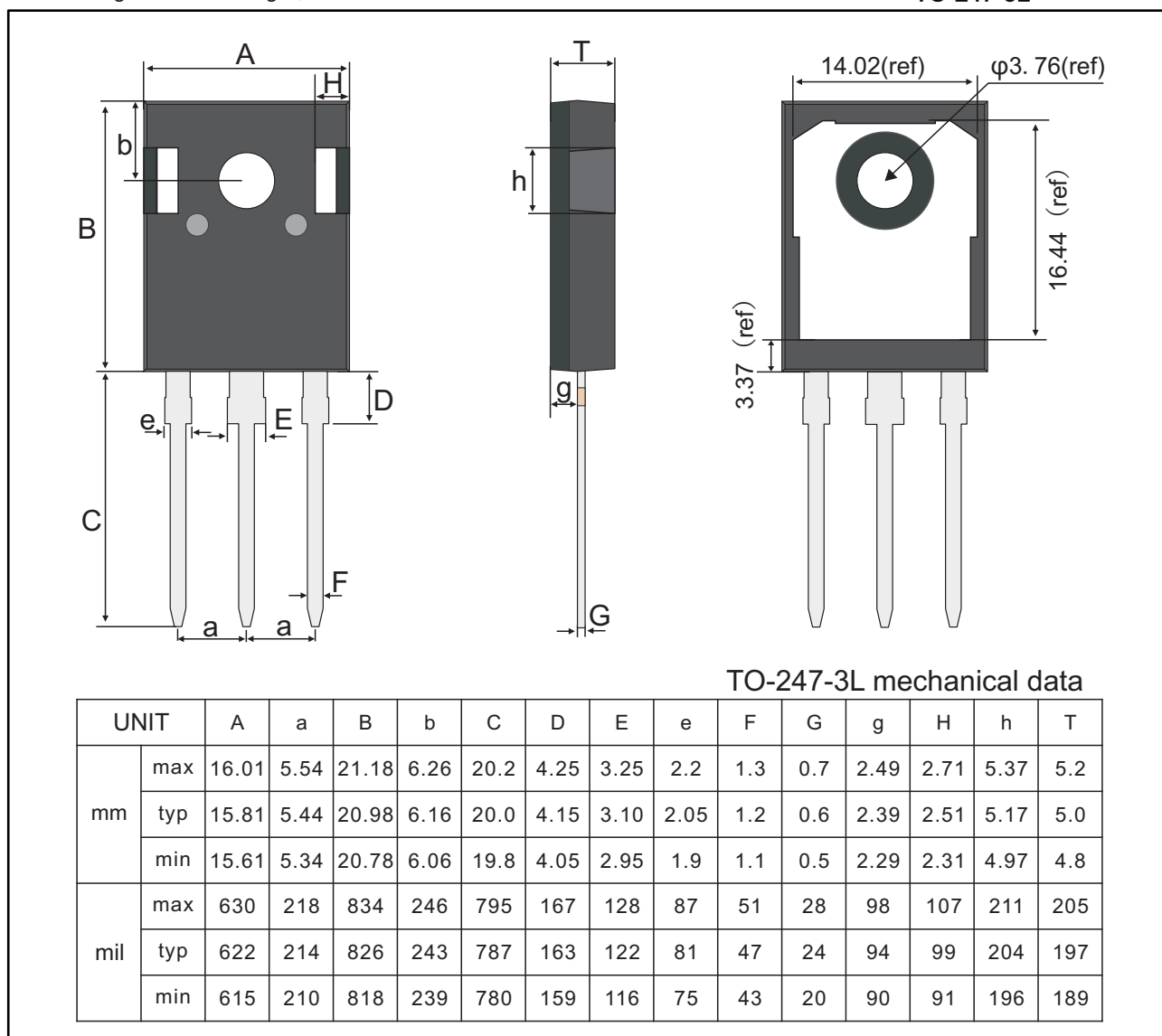
Fig.12 Max. Transient Thermal Impedance





Package Outline
Through Hole Package ; 3 leads

TO-247-3L



Marking

Type number	Marking code
W65R110TP1	W65R110TP1



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