

Applications:

- H/EV Power Train and Chargers
- PV and industrial applications
- Microgrid systems
- Induction heating and welding
- UPS, DC/DC Converters

Features:

- Low Terminal Capacitances
- Very low $R_{DS,on}$ over the entire temperature range
- High Speed Switching Characteristics
- Fast and Reliable Body Diode
- High Avalanche Energy
- High Operating Junction Temperature

Absolute Maximum Ratings ($T_{amb}=25^{\circ}\text{C}$, unless specified otherwise)

Symbol	Parameter	Value	Unit
V_{DS}	Maximum DC Reverse Voltage	1200	V
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		
I_D	Continuous Drain Current ($T_C = 25^{\circ}\text{C}$)	160	A
I_{DMax}	Maximum Drain Current ($T_C = 100^{\circ}\text{C}$)	125	
V_{gs}	Gate Source Voltage	23 to -10	V
PD	Total Power Dissipation ($T_C = 25^{\circ}\text{C}$)	750	W
T_j	Operating junction temperature range	-55 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-55 to 175	
T_L	Lead temperature, soldering	260	

Static Electrical Characteristics ($T_C = T_A = 25\text{ }^{\circ}\text{C}$, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{gs} = 0\text{ V}, I_d = 100\text{ }\mu\text{A}$	1200	1450		V
$R_{DS,on}$	Drain-Source ON Resistance	$V_{gs} = 18\text{ V}, I_d = 100\text{ A}$		12.5	16	m Ω
		$V_{gs} = 18\text{ V}, I_d = 100\text{ A}, T_j = 175^{\circ}\text{C}$		20.5	25	
V_{th}	Gate-Source Threshold Voltage	$V_{gs} = V_{ds}, I_d = 30\text{ mA}$	2.0	2.8	3.6	V
		$V_{gs} = V_{ds}, I_d = 30\text{ mA}, T_j = 175^{\circ}\text{C}$	1.8	2.1		
I_{DSS}	Drain-Source Leakage current	$V_{gs} = 0\text{ V}, V_{ds} = 1200\text{ V}$		0.8	100	μA
		$V_{gs} = 0\text{ V}, V_{ds} = 1200\text{ V}, T_C = 175\text{ }^{\circ}\text{C}$		10	500	
g_{fs}	Trans-conductance	$V_{ds} = 20\text{ V}, I_d = 100\text{ A}, T_j = 175^{\circ}\text{C}$		61		S
		$V_{ds} = 20\text{ V}, I_d = 100\text{ A}, T_j = 175^{\circ}\text{C}$		52.8		
I_{GSS}	Gate-Source Leakage Current	$-10\text{ V} < V_{gs} < 23\text{ V}$		1	100	nA

Dynamic Characteristics ($T_C = T_A = 25\text{ }^{\circ}\text{C}$, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{gs} = 0\text{ V}, V_{ds} = 1000\text{ V}, f = 1\text{ MHz}$		5100		pF
C_{rss}	Reverse Transfer Capacitance			6.7		
C_{oss}	Output Capacitance			270		
Q_{gs}	Gate-Source Gate Charge	$V_{ds} = 800\text{ V}, I_d = 80\text{ A}, V_{gs,off} = -5\text{ V}, V_{gs,on} = 18\text{ V}$		78		nC
Q_{gd}	Gate-Drain Gate Charge			46		
Q_g	Total Gate Charge			213		

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on delay time	$V_{gs} = -5/18\text{ V}$, $V_{ds} = 800\text{ V}$, $I_d = 80\text{ A}$, $R_g = 2.2\Omega$, $L = 110\mu\text{H}$, $T_j = 25^\circ\text{C}$		18.5		ns
t_r	Rise time			24.7		
$t_{d(off)}$	Turn-off delay time			43.6		
t_f	Fall time			8.3		
E_{on}	Turn On Switching Energy	$V_{gs} = -5/18\text{ V}$, $V_{ds} = 800\text{ V}$, $I_d = 80\text{ A}$, $R_g = 2.2\Omega$, $L = 110\mu\text{H}$, $T_j = 175^\circ\text{C}$		869		μJ
E_{off}	Turn Off Switching Energy			264		
$t_{d(on)}$	Turn-on delay time			16.8		ns
t_r	Rise time			28.2		
$t_{d(off)}$	Turn-off delay time	$V_{gs} = -5/18\text{ V}$, $V_{ds} = 800\text{ V}$, $I_d = 80\text{ A}$, $R_g = 2.2\Omega$, $L = 110\mu\text{H}$, $T_j = 175^\circ\text{C}$		54.4		
t_f	Fall time			9.4		
E_{on}	Turn On Switching Energy			1030		μJ
E_{off}	Turn Off Switching Energy			325		
R_g	Gate Series Resistance	$V_{ds} = V_{gs} = 0\text{ V}$, $f = 1\text{ MHz}$, $T_a = 25^\circ\text{C}$		1.7		Ω
EAS	Avalanche Energy, Single Pulse	$V_{dd} = 50\text{ V}$, $L = 5\text{ mH}$		4400		mJ

Thermal and Mechanical Characteristics

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal Resistance			0.19	0.2	K/W

Body Diode Characteristics ($T_C = T_A = 25\text{ }^{\circ}\text{C}$, unless specified otherwise)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{sd}	Diode Forward Voltage	$V_{gs} = -5\text{ V}, I_{sd} = 80\text{ A},$		5.01		V
		$V_{gs} = -5\text{ V}, I_{sd} = 80\text{ A},$ $T_j = 175^{\circ}\text{C}$		4.44		
I_s	Continuous Diode Forward Current				140	A
t_{rr}	Reverse Recovery Time	$V_{ds} = 800\text{ V}, I_d = 80\text{ A},$ $V_{gs} = -5\text{ V}, V_{gs,on} = 18\text{ V},$ $di/dt = 5400\text{ A}/\mu\text{s},$		16.6		ns
Q_{rr}	Reverse Recovery Charge			0.7		μC
I_{mm}	Peak Reverse Recovery Current			64.2		A
t_{rr}	Reverse Recovery Time	$V_{ds} = 800\text{ V}, I_d = 80\text{ A},$ $V_{gs} = -5\text{ V}, V_{gs,on} = 18\text{ V},$ $di/dt = 5400\text{ A}/\mu\text{s},$ $T_j = 175^{\circ}\text{C}$		26.1		ns
Q_{rr}	Reverse Recovery Charge			1.7		μC
I_{mm}	Peak Reverse Recovery Current			107.4		A

Electrical Characteristic Diagrams

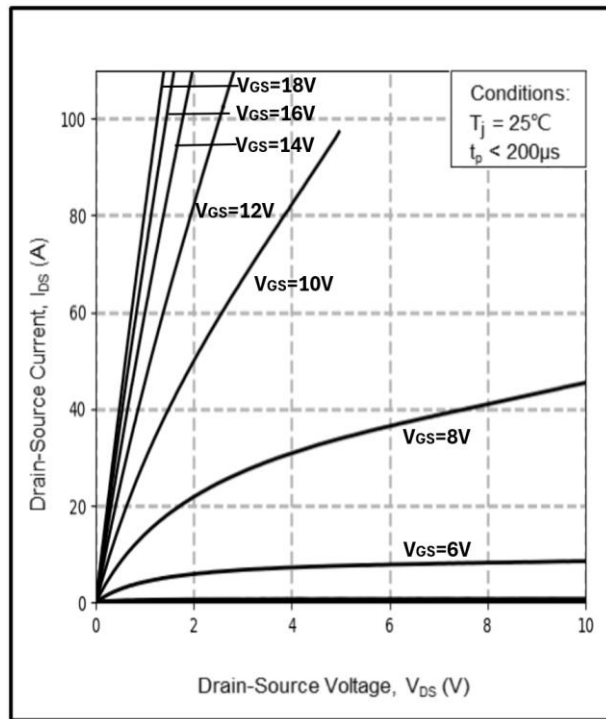
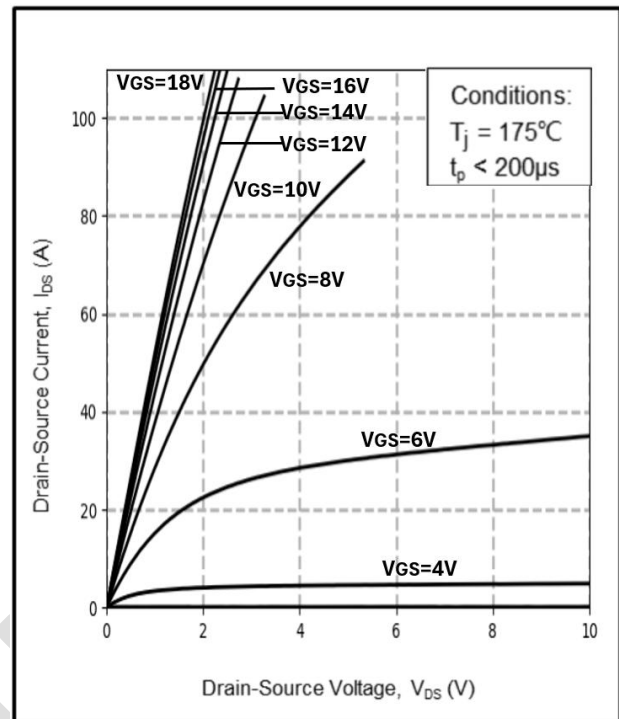
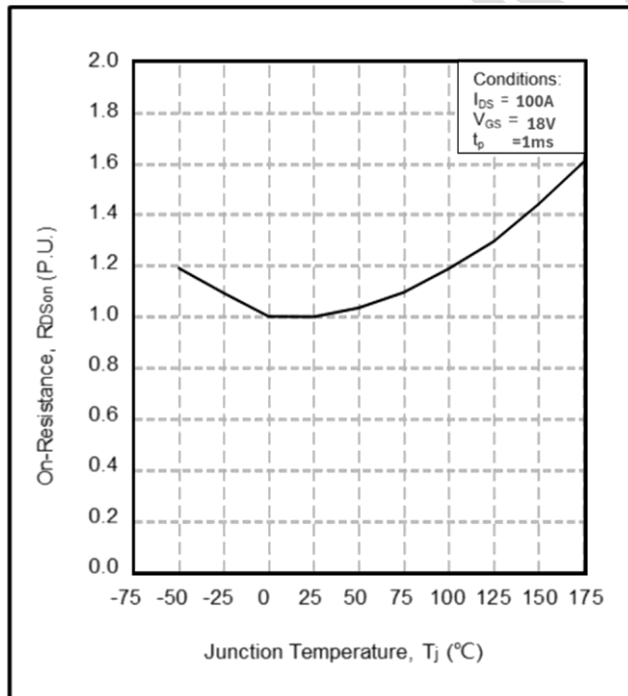
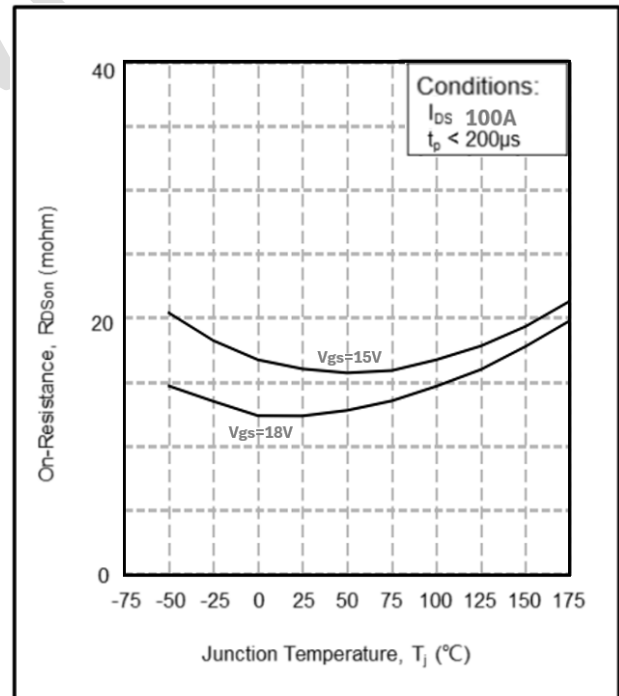
Figure 1. Output characteristics at $T_j = 25^\circ\text{C}$ Figure 2. Output characteristics at $T_j = 175^\circ\text{C}$ 

Figure 3. On-resistance vs. temperature

Figure 4. On-resistance vs. temperature
for various gate voltages

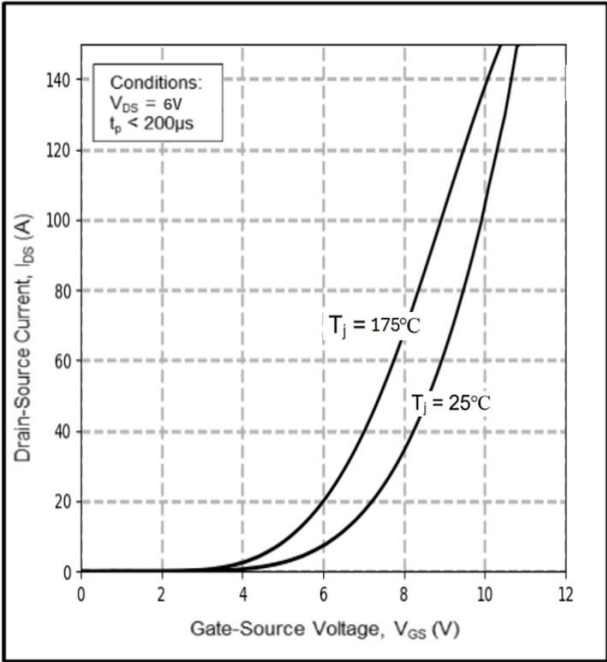


Figure 5. Transfer characteristic
for various junction temperatures

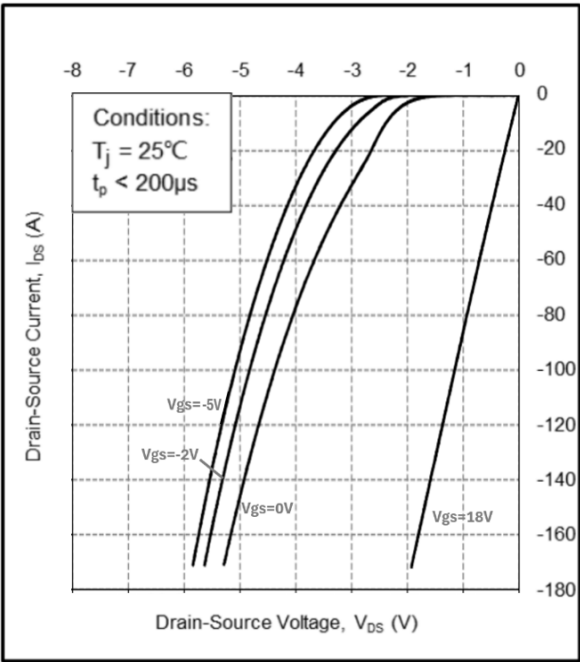


Figure 6. Body diode characteristic at $T_J = 25^\circ\text{C}$

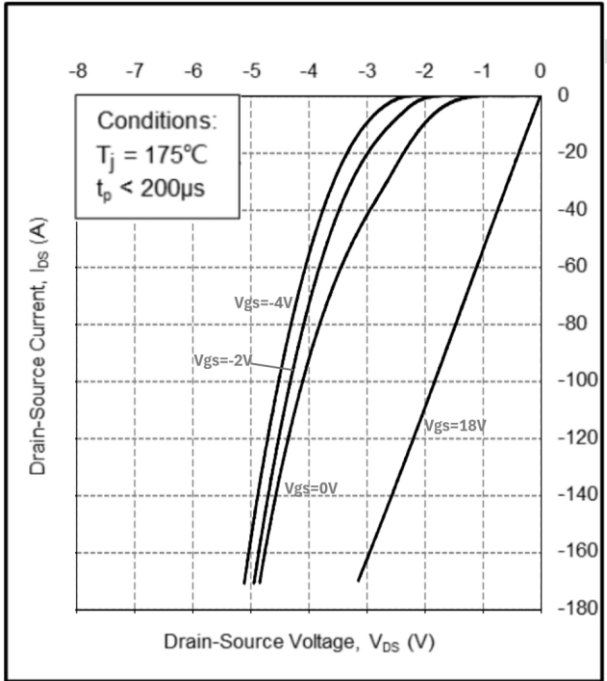


Figure 7. Body diode characteristic at $T_J = 175^\circ\text{C}$

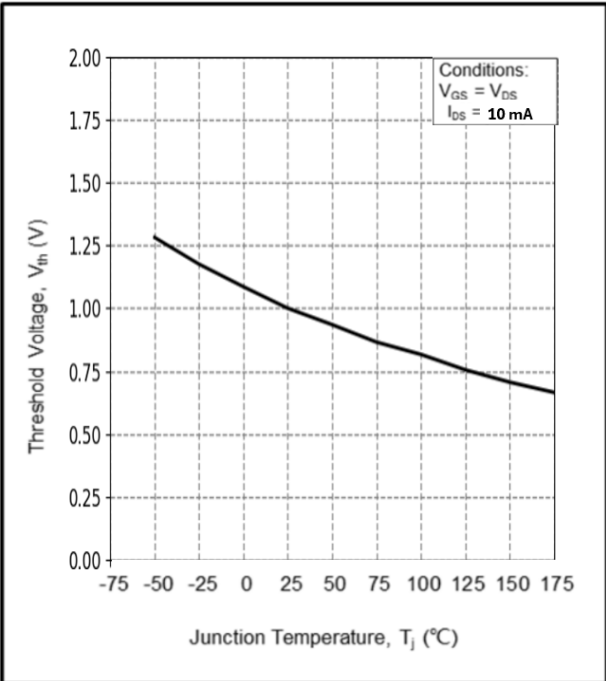


Figure 8. Threshold voltage vs. temperature

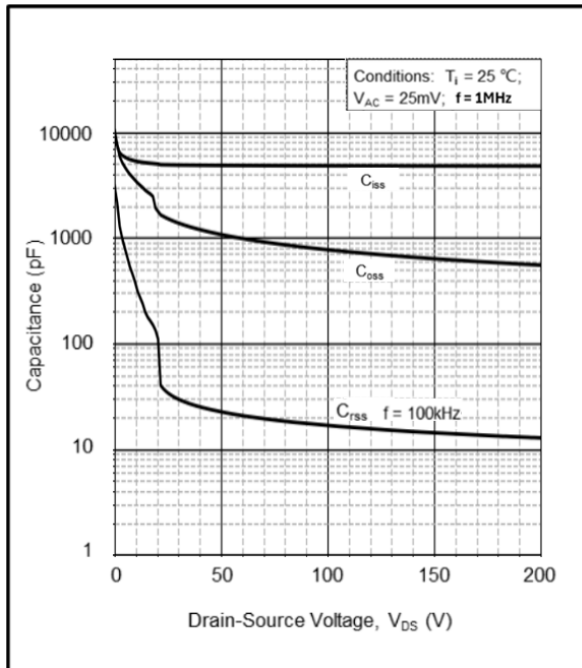


Figure 9. Capacitance vs. drain-source voltage
(0 - 200V)

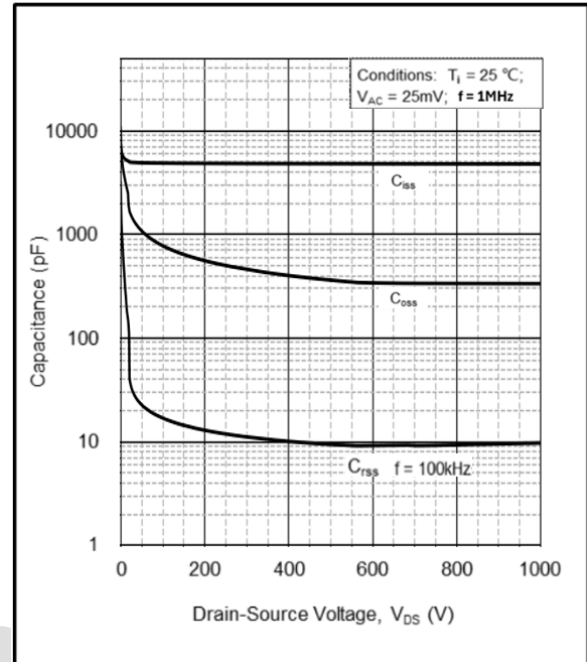


Figure 10. Capacitance vs. drain-source voltage
(0 - 1000V)

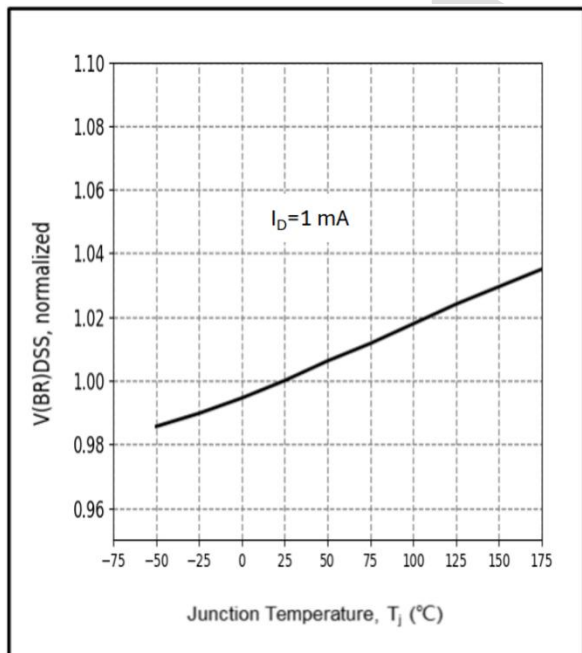


Figure 11. Normalized breakdown voltage
vs. temperature

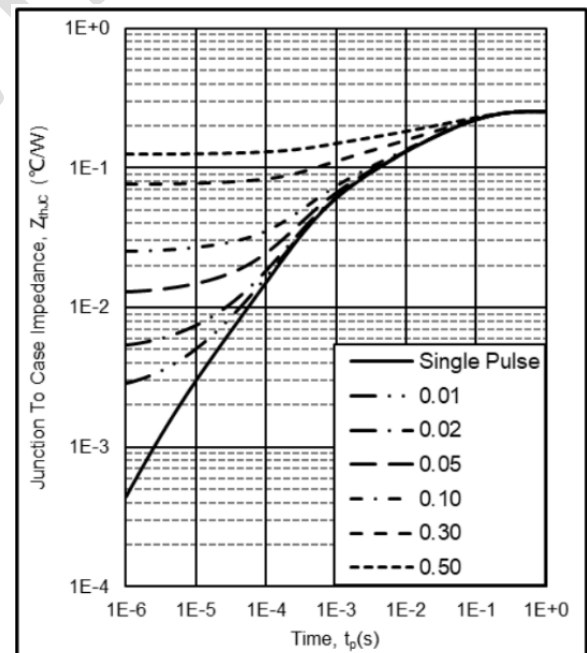


Figure 12. Transient thermal impedance
(Junction - Case) vs. temperature

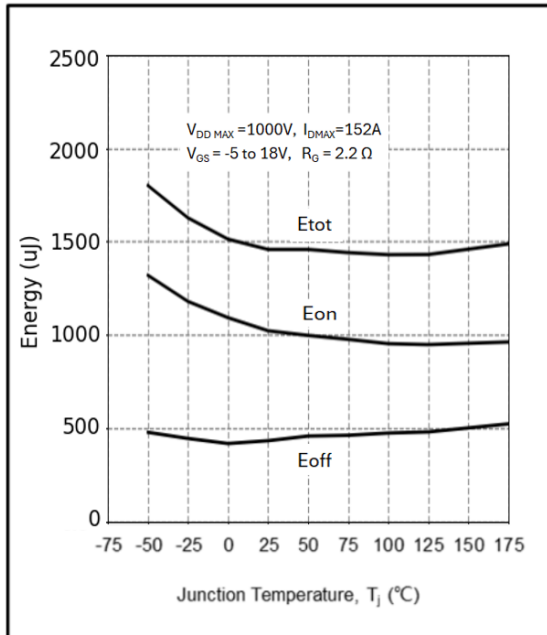


Figure 13. Switching energy vs. temperature

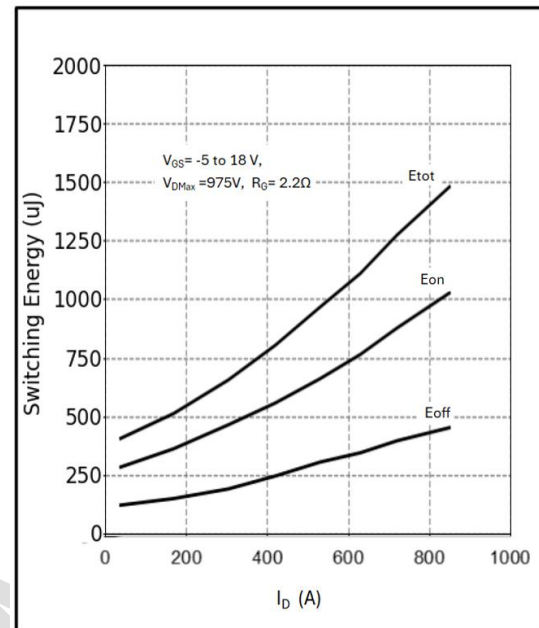


Figure 14. Switching Energy vs. drain current

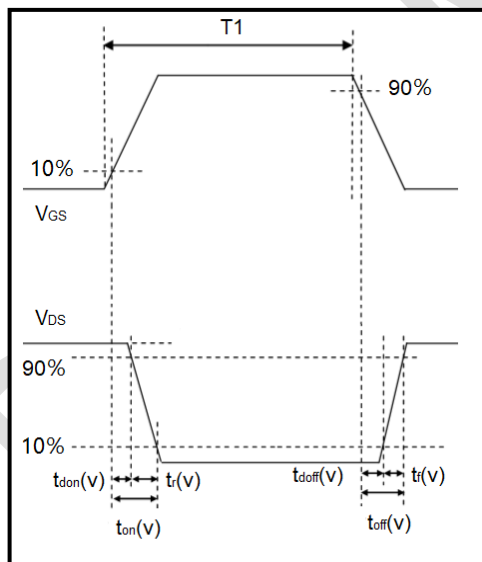


Figure 14. Switching times definition

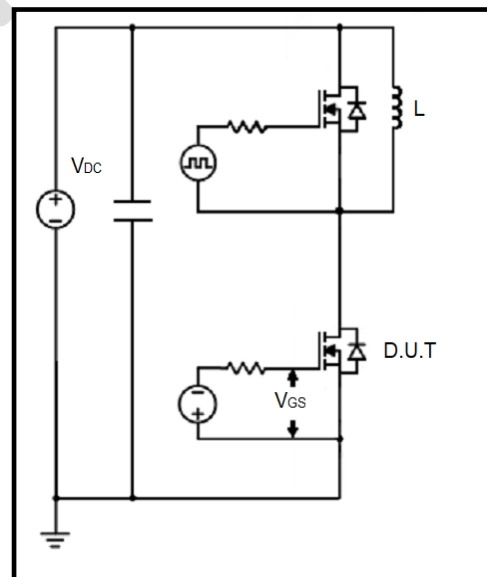
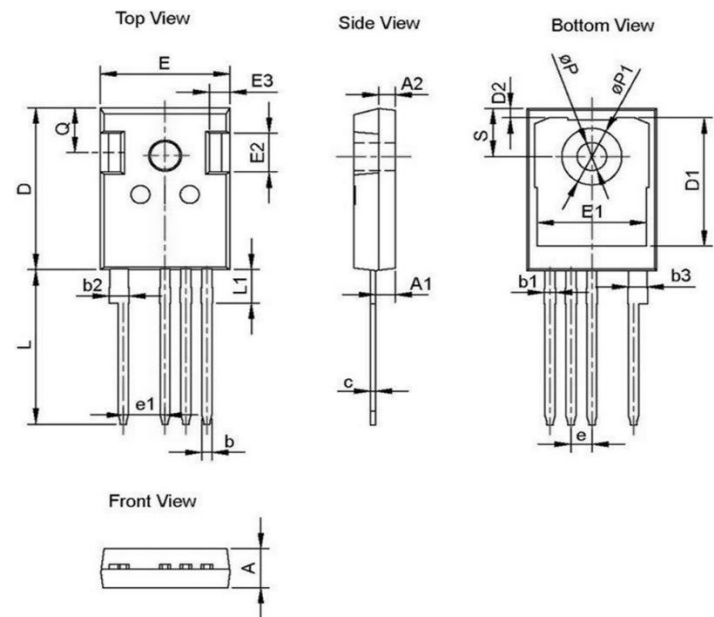


Figure 15. Clamped inductive switching waveform test circuit

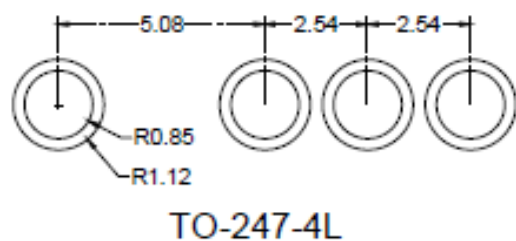
Package Information:



Dimension unit: [mm]			
Symbol	Min	Nom	Max
A	4.8	5	5.2
A1	2.21	2.41	2.61
A2	1.85	2	2.15
b	1.11	1.21	1.36
b1	1.11	1.37	1.57
b2	2.24	2.4	2.6
b3	2.11	2.21	2.36
c	0.51	0.6	0.75
D	20.7	20.9	21.3
D1	15.92	16.22	16.52
D2	1	1.2	1.35
E	15.5	15.8	16.1
E1	13	13.3	13.6
E2	4.8	5	5.2
E3	2.3	2.5	2.7
e	2.54 BSC		
e1	5.08 BSC		

Recommended Solder Pad Layout

Note: All dimensions are in mm



Ordering Information

Part number	AAR013V120H3n
Package	TO-247-4L
Unit quantity	300 EA
Packing type	Tube