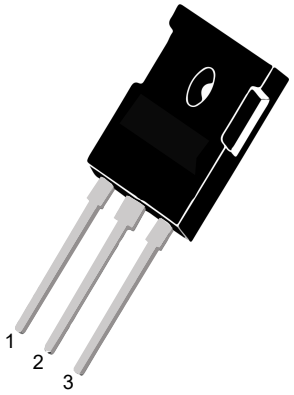
600 V, 100 A Superjunction MOSFET

APT100N60BC7

Product Overview

600 V, 15 mΩ typical at V_{GS} = 10 V Superjunction MOSFET, TO-247.



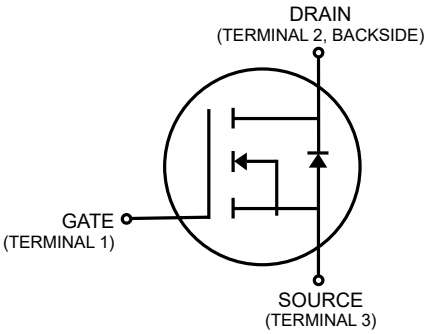


Table 1. Ordering Information

Catalog Part Number (CPN)	Package	Packing Media (Qty.)	Qualification
APT100N60BC7	TO-247	Tube (30)	Industrial

Features

- Lower on-resistance at the same voltage
- Ultra-fast reverse recovery
- Low gate charge and output capacitance
- Avalanche rated
- RoHS compliant

Benefits

- Lower conduction losses
- Lower switching losses in both hard and soft switching topologies
- Reliable operation at high switching frequencies
- Superior hard commutation ruggedness
- High power density for lower system cost

Applications

- Switch-mode power supplies (SMPS)
- DC-DC converters
- Zero-voltage switching (ZVS)
- Resonant LLC converters
- Power factor correction (PFC)
- Solar inverters (photovoltaic)
- Industrial power systems

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1. Device Specifications

This section shows the specifications of this device.

1.1. Absolute Maximum Ratings

The following table shows the absolute maximum ratings of this device.

Table 1-1. Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_{DSS}	Drain source voltage	600	V
I_D	Continuous drain current at T_C = 25 °C	120	A
	Continuous drain current at T_C = 100 °C	76	
I_{DM}	Pulsed drain current[1]	460	
V_{GS}	Gate-source voltage	20/–20	V
	Transient gate-source voltage	30/–30	
P_D	Total power dissipation at T_C = 25 °C	416	W
	Linear derating factor	3.33	W/°C

Note:

1. Repetitive rating: Pulse width and case temperature are limited by the maximum junction temperature.

1.2. Thermal and Mechanical Characteristics

The following table shows the thermal and mechanical characteristics of this device.

Table 1-2. Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			0.30	°C/W
T_J	Operating junction temperature	–55		150	°C
T_{STG}	Storage temperature	–55		150	
T_L	Lead temperature for 10 seconds			300	°C
τ_M	Mounting torque, M3 screw for heat sink attachment (requires 1, not included)		0.8		N·m
Wt	Package weight		6.2		g

ESD practices should comply with JESD-625.

1.3. Electrical Performance

The following table shows the static characteristics of this device at T_J = 25 °C unless otherwise specified.

Table 1-3. Static Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 1.0 mA	600			V
$R_{DS(on)}$	Drain-source on resistance[1]	V_{GS} = 10 V, I_D = 58.2 A		15	18	mΩ
		V_{GS} = 10 V, I_D = 58.2 A, T_J = 150 °C		29		
$V_{GS(th)}$	Gate-source threshold voltage	V_{GS} = V_{DS}, I_D = 2.91 mA	3.5	4.0	4.5	V
I_{DSS}	Zero gate voltage drain current	V_{DS} = 600 V, V_{GS} = 0 V			1.0	µA
		V_{DS} = 600 V, V_{GS} = 0V, T_J = 125 °C		60	240	
I_{GSS}	Gate-source leakage current	V_{GS} = 30 V/–30 V			±100	nA

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Note:

1. Pulse test: pulse width < 380 µs, duty cycle < 2%.

The following table shows the dynamic characteristics of the device at T_J = 25 °C unless otherwise specified.

Table 1-4. Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{GS} = 0V, V_{DD} = 400 V, ƒ = 100 kHz		11225		pF
C_{rss}	Reverse transfer capacitance			32		
C_{oss}	Output capacitance			186		
Q_G	Total gate charge	V_{GS} = 10 V, V_{DD} = 300 V, I_D = 100 A		226		nC
Q_{GS}	Gate-source charge			65		
Q_{GD}	Gate-drain charge			90		
$t_{d(on)}$	Turn-on delay time	V_{DD} = 400 V, V_{GS} = 10 V, I_D = 100 A, R_G = 5 Ω, T_J = 125 °		64		ns
t_r	Rise time			146		
$t_{d(off)}$	Turn-off delay time			235		
t_f	Fall time			120		
E_{on}	Turn-on switching energy			4635		µJ
E_{off}	Turn-off switching energy			2900		
ESR	Gate equivalent series resistance	f = 1 MHz, 25 mV, drain-to-source short		2.7		Ω
E_{AS}	Avalanche energy, single pulse	I_D = 9.3 A, 100% UIS production tested	582			mJ

The following table shows the body diode characteristics of the device at T_J = 25 °C unless otherwise specified.

Table 1-5. Body Diode Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode forward voltage	I_{SD} = 58 A, V_{GS} = 0 V		1.0		V
t_{rr}	Reverse recovery time	I_{SD} = 58 A, V_{GS} = 0 V, V_{DD} = 400 V, dI/dt = –100 A/µs		216		ns
Q_{rr}	Reverse recovery charge			2013		nC
I_{RRM}	Reverse recovery current			16.3		A

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1.4. Typical Performance Curves

Figure 1-1. Drain Current vs. V_{DS} at T_J

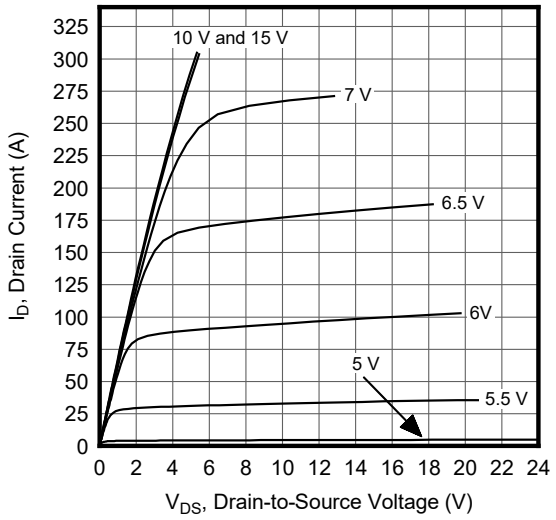

Figure 1-2. Drain Current vs. V_{GS}

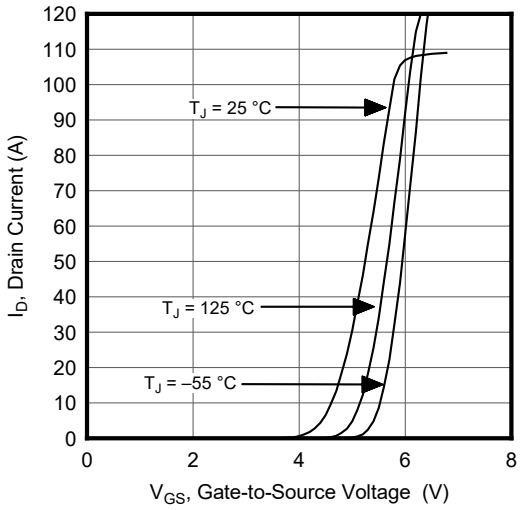

Figure 1-3. Reverse Drain Current vs. Drain Current

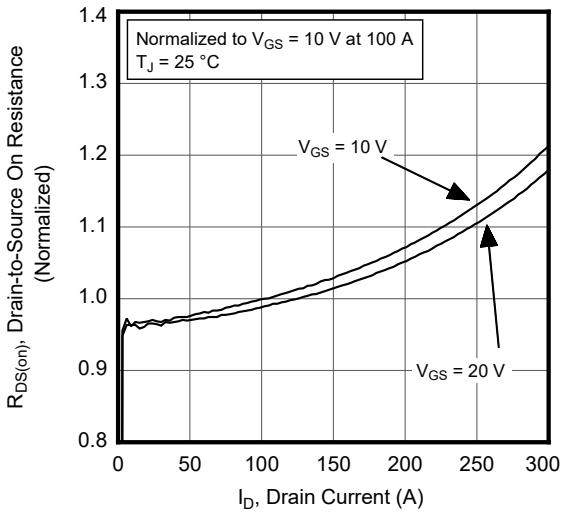

Figure 1-4. Maximum Drain Current vs. Case Temperature

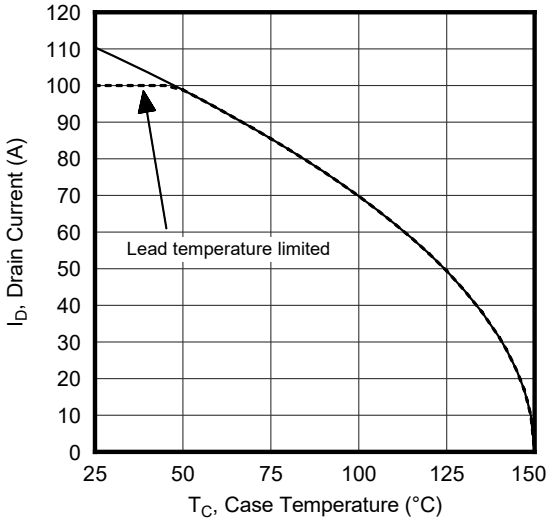

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Figure 1-5. BV_{DSS} vs. Junction Temperature

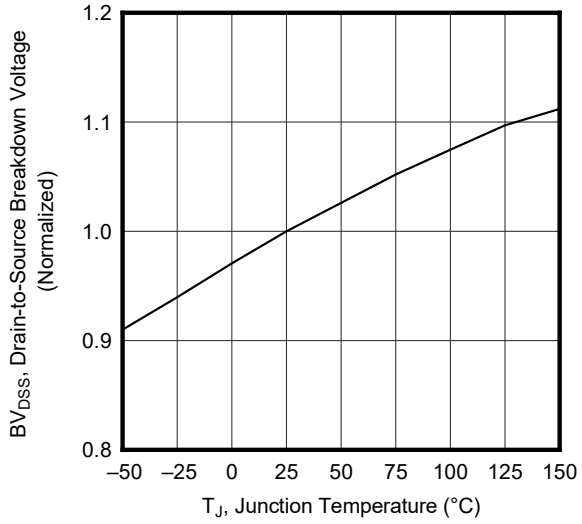

Figure 1-6. $R_{DS(on)}$ vs. Junction Temperature

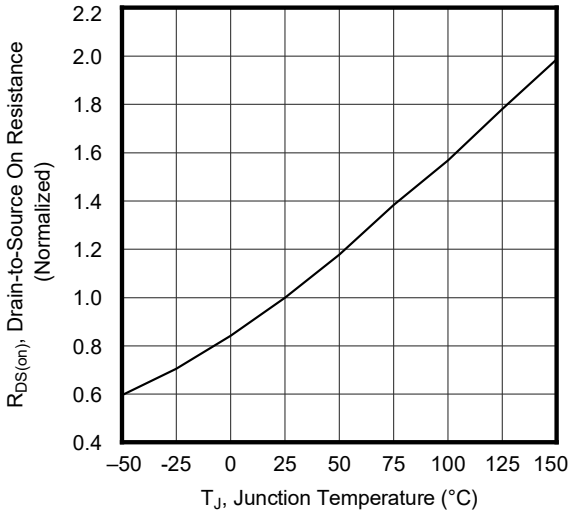

Figure 1-7. Threshold Voltage vs. Case Temperature

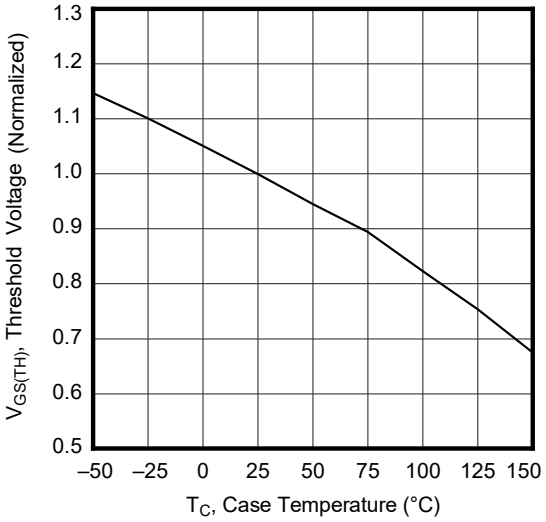

Figure 1-8. Capacitance vs. Drain-to-Source Voltage

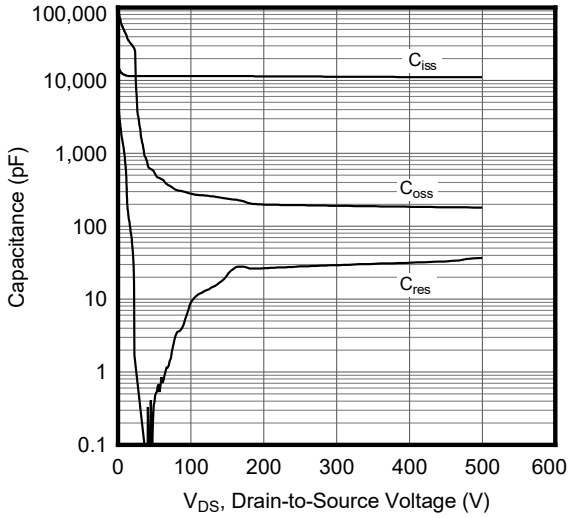

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Figure 1-9. Gate-to-Source Voltage vs. Gate Charge

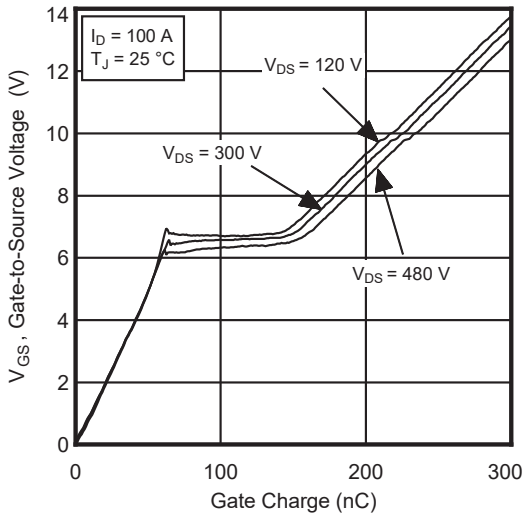

Figure 1-10. Reverse Drain Current vs. Source-to-Drain Voltage

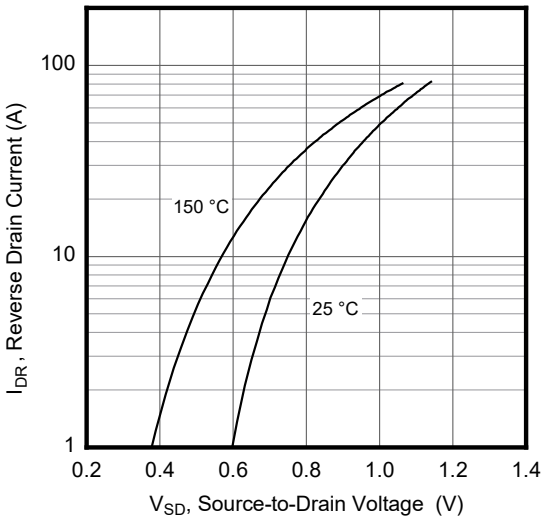

Figure 1-11. Forward Safe Operating Area

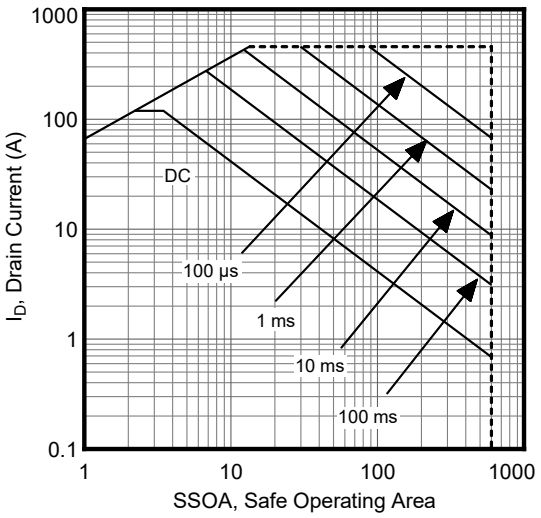

Figure 1-12. Delay Time vs. Drain Current

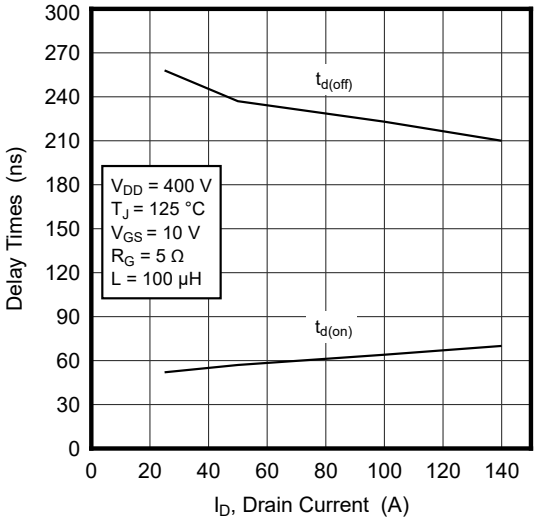

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Figure 1-13. Rise/Fall Time vs. Drain Current

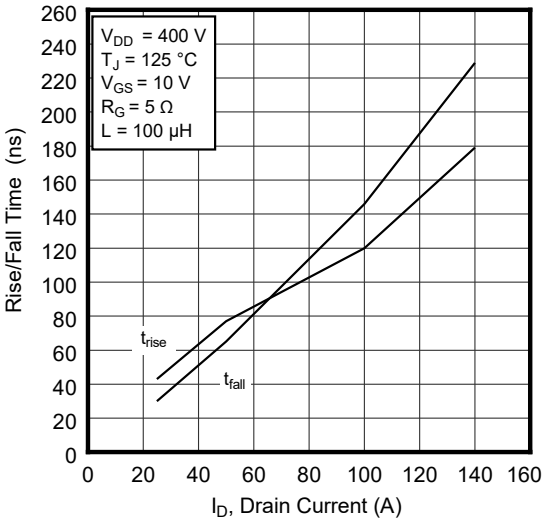

Figure 1-14. Eon/Eoff Energy vs. Drain Current

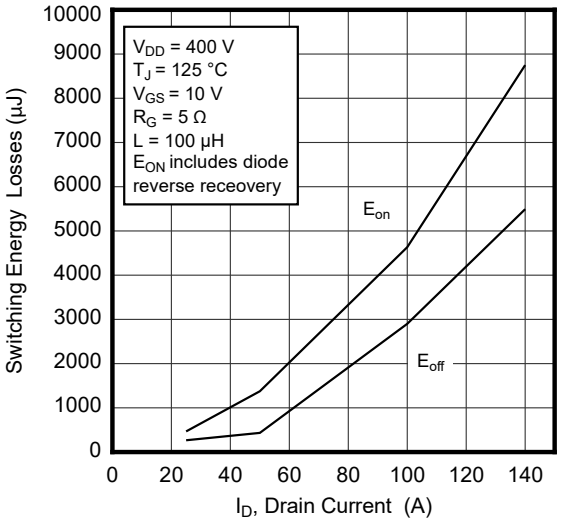

Figure 1-15. Maximum Transient Thermal Impedance

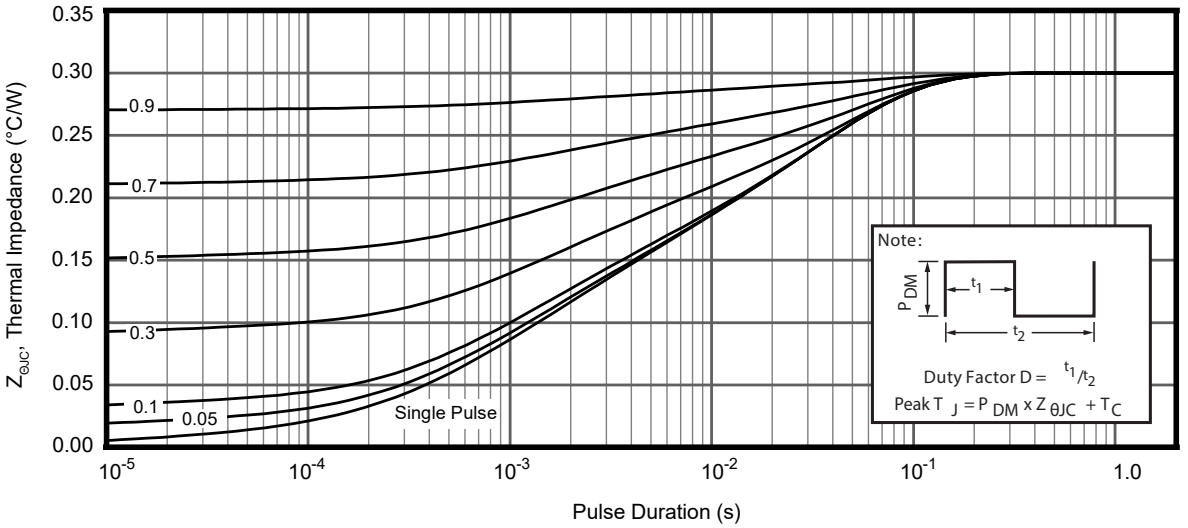

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Figure 1-16. Turn-on Switching Waveform and Definitions

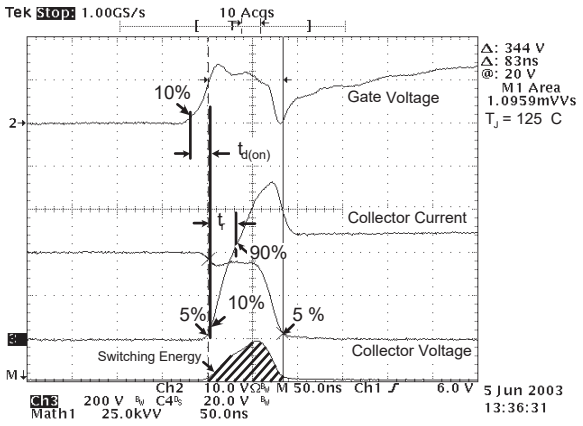


Figure 1-17. Turn-off Switching Waveform and Definitions

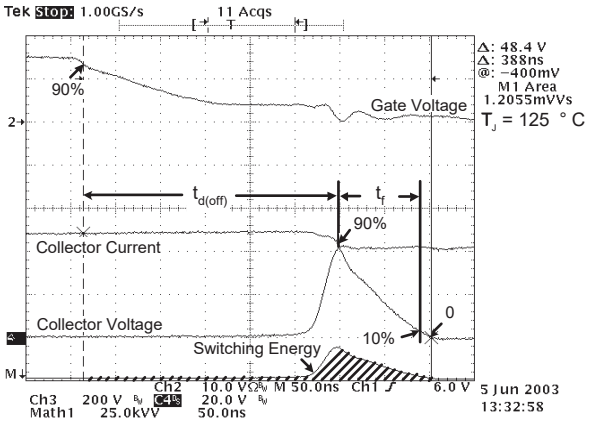
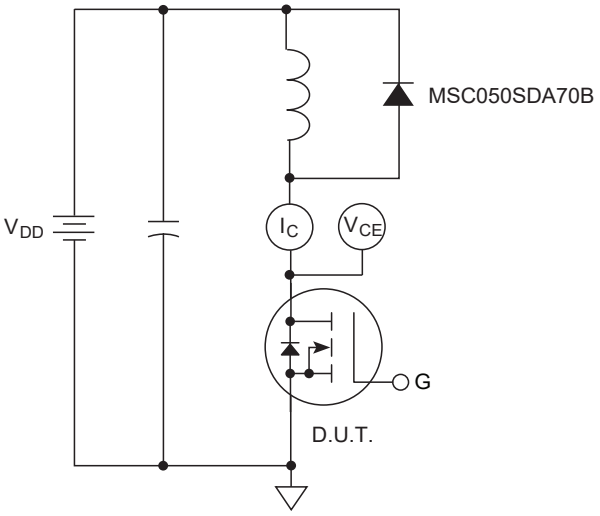


Figure 1-18. Inductive Switching Test Circuit



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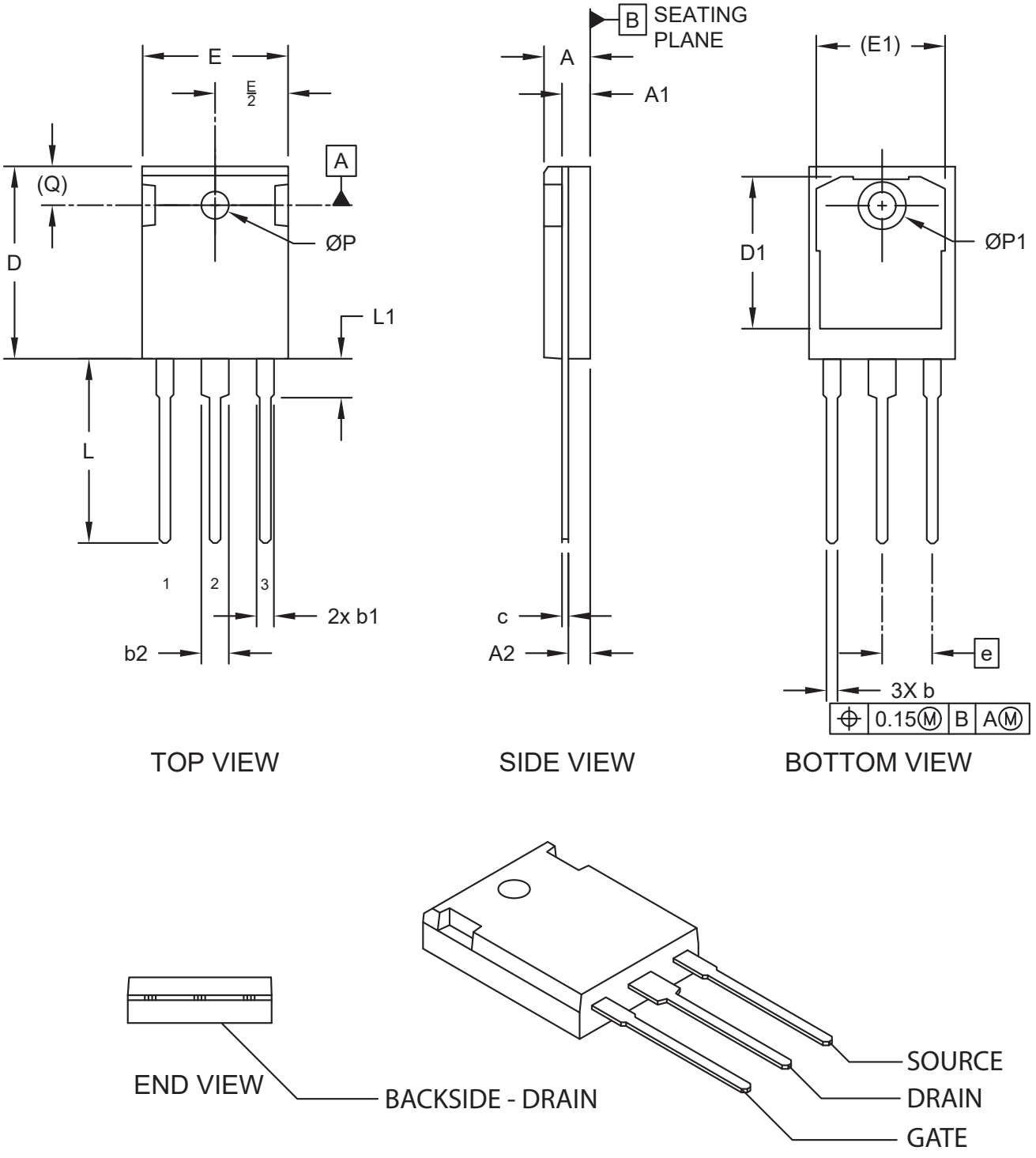
2. Package Specification

This section shows the package specification of this device.

2.1. Package Outline Drawing

The following figure illustrates the TO-247 package outline of this device.

Figure 2-1. Package Outline Drawing



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The following table shows the TO-247 dimensions and should be used in conjunction with the package outline drawing.

Table 2-1. TO-247 Dimensions

Symbol	Description	Min. (mm)	Max. (mm)
N	Number of leads	3	
e	Pitch	5.44 BSC	
A	Overall height	4.70	5.31
A1	Tab height	1.50	2.49
A2	Seating plane to lead	2.21	2.59
b	Lead width	1.02	1.40
b1	Lead shoulder width (X2)	1.65	2.41
b2	Lead shoulder width	2.87	3.38
c	Lead thickness	0.41	0.79
L	Lead length	19.81	20.32
L1	Lead shoulder length	3.99	4.50
D	Molded body length	20.80	21.46
D1	Thermal pad length	16.25	17.65
E	Total width	15.49	16.26
E1	Thermal pad width	13.10	14.50
Q	Hole center to tab edge	6.15 REF	
∅P	Hole diameter	3.51	3.81
∅P1	Thermal pad hole diameter	7.18 REF	

Notes:
Dimensioning and tolerancing per ASME Y14.5M.

- BSC: Basic dimension. Theoretically exact value shown without tolerances.
- REF: Reference dimension, usually without tolerance, for information purposes only.

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3. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Table 3-1. Revision History

Revision	Date	Description
A	03/2026	Document created.

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