C4MV015065T

650V 15mΩ VGS Optimized Silicon Carbide Power MOSFET
N-Channel Enhancement Mode

Features

- Industry compatible drive voltage +15V..18V
- Industry standard Top Side Cooled (TSC) package
- High power dissipation capability
- Optimized package with separate driver source pin
- High-speed switching with low capacitances
- Soft body diode to minimize voltage overshoots
- Halogen free, RoHS compliant

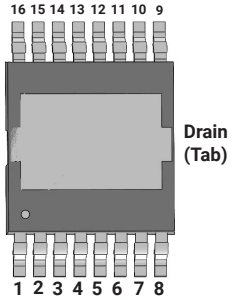
Benefits

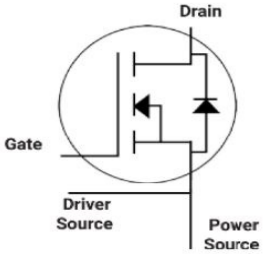
- Compatible with industry standard gate drivers
- Increase power density
- Reduce cooling requirements
- Reduce switching losses and minimize gate ringing
- Higher system efficiency
- Increase system switching frequency

Applications

- EV Chargers
- Solar/ESS
- Motor Control
- Industrial Power Supplies
- High Voltage DC/DC Converters

Package





Orderable Part Number	Package	Marking
C4MV015065T-TR	TOLT (TSC)	C4MV015065T

Key Parameters

Parameter	Symbol	Min.	Typ.	Max	Unit	Conditions	Note
Drain - Source Voltage	V_{DS}			650	V	T_C = 25°C	
Maximum Gate - Source Voltage	V_{GS}	-10		+23			Refer to PRD-04814
DC Continuous Drain Current	I_D		150		A	V_{GS} = 18 V, T_C = 25 °C, T_J ≤175 °C	Fig 19 Note 1
			111			V_{GS} = 18 V, T_C = 100 °C, T_J ≤175 °C	
Pulsed Drain Current	I_{DM}			390		t_{Pmax} limited by T_{jmax} V_{GS} = 18V, T_C = 25 °C	Fig 22
Power Dissipation	P_D		714		W	T_C = 25 °C, T_J = 175 °C	Fig 20
Operating Junction and Storage Temperature	T_J, T_{stg}	-55		175	°C		
Solder Temperature	T_L			260		According to JEDEC J-STD-020	

Note (1): Verified by Design

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Electrical Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650			V	V_{GS} = 0 V, I_D = 100 µA	
$V_{GS(th)}$	Gate Threshold Voltage	1.8	2.6	3.8	V	V_{DS} = V_{GS}, I_D = 15.32 mA	Fig. 11
			2.2			V_{DS} = V_{GS}, I_D = 15.32 mA, T_J = 175ºC	
I_{DSS}	Zero Gate Voltage Drain Current		1	50	µA	V_{DS} = 650 V, V_{GS} = 0 V	
I_{GSS}	Gate-Source Leakage Current		10	250	nA	V_{GS} = 18 V, V_{DS} = 0 V	
$V_{GS\ (op)}$	Recommended Turn On Gate-Source Voltage		+15..+18		V		Refer to PRD-09634
	Recommended Turn Off Gate-Source Voltage		-5..0				
$R_{DS(on)}$	Drain-Source On-State Resistance		15	21	mΩ	V_{GS} = 18 V, I_D = 55.72 A	Fig. 4, 5, 6
			27			V_{GS} = 18 V, I_D = 55.72 A, T_J = 175ºC	
			18			V_{GS} = 15 V, I_D = 55.72 A	
g_{fs}	Transconductance		42		S	V_{DS}= 20 V, I_{DS}= 55.72 A	Fig. 7
			39			V_{DS}= 20 V, I_{DS}= 55.72 A, T_J = 175ºC	
C_{iss}	Input Capacitance		4488		pF	V_{GS} = 0 V, V_{DS} = 0V to 400 V f = 100 kHz V_{AC} = 25 mV	Fig. 17, 18
C_{oss}	Output Capacitance		277				
C_{rss}	Reverse Transfer Capacitance		24				
E_{oss}	C_{oss} Stored Energy		28		µJ		Fig. 16
$C_{o(er)}$	Effective Output Capacitance (Energy Related)		362		pF	V_{GS} = 0 V, V_{DS} = 0... 400V	Note: 3
$C_{o(tr)}$	Effective Output Capacitance (Time Related)		517				
E_{ON}	Turn-On Switching Energy (Diode FWD)		110		µJ	V_{DS}= 400 V, V_{GS}= -4 V/18 V, I_D= 55.72 A, $R_{G(ext)}$ = 2.5 Ω, L= 59 µH, T_J = 175ºC FWD = Internal Body Diode	
E_{OFF}	Turn-Off Switching Energy (Diode FWD)		66				
$t_{d(on)}$	Turn-On Delay Time		16		ns	V_{DD} = 400 V, V_{GS} = -4 V/18 V I_D = 55.72 A, $R_{G(ext)}$ = 2.5 Ω, Timing relative to V_{DS} Inductive load	
t_r	Rise Time		7				
$t_{d(off)}$	Turn-Off Delay Time		41				
t_f	Fall Time		10				
$R_{G(int)}$	Internal Gate Resistance		1.5		Ω	f = 1 MHz	
Q_{gs}	Gate to Source Charge		46		nC	V_{DS} = 400 V, V_{GS} = -4 V/18 V I_D = 55.72 A Per IEC60747-8-4 pg 21	Fig. 12
Q_{gd}	Gate to Drain Charge		48				
Q_g	Total Gate Charge		178				

Note (3): $C_{o(er)}$, a lumped capacitance that gives same stored energy as Coss while Vds is rising from 0 to 400V
$C_{o(tr)}$, a lumped capacitance that gives same charging time as Coss while Vds is rising from 0 to 400V

Reverse Diode Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.9		V	V_{GS} = -4 V, I_{SD} = 27.9 A, T_J = 25 °C	Fig. 8, 9, 10
		4.4			V_{GS} = -4 V, I_{SD} = 27.9 A, T_J = 175 °C	
I_S	Continuous Diode Forward Current		100	A	V_{GS} = -4 V, T_C = 25˚C	
I_{SM}	Diode pulse Current		390		V_{GS} = -4 V, pulse width t_P limited by T_{jmax}	
t_{rr}	Reverse Recovery time	14		ns	V_{GS} = -4 V, I_{SD} = 55.72 A, V_R = 400 V dif/dt = 11638 A/µs, T_J = 175 °C	
Q_{rr}	Reverse Recovery Charge	934		nC		
I_{rrm}	Peak Reverse Recovery Current	106		A		
t_{rr}	Reverse Recovery time	48		ns	V_{GS} = -4 V, I_{SD} = 55.72 A, V_R = 400 V dif/dt = 2115 A/µs, T_J = 175 °C	
Q_{rr}	Reverse Recovery Charge	327		nC		
I_{rrm}	Peak Reverse Recovery Current	23		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.21	°C/W		Fig. 21

Typical Performance

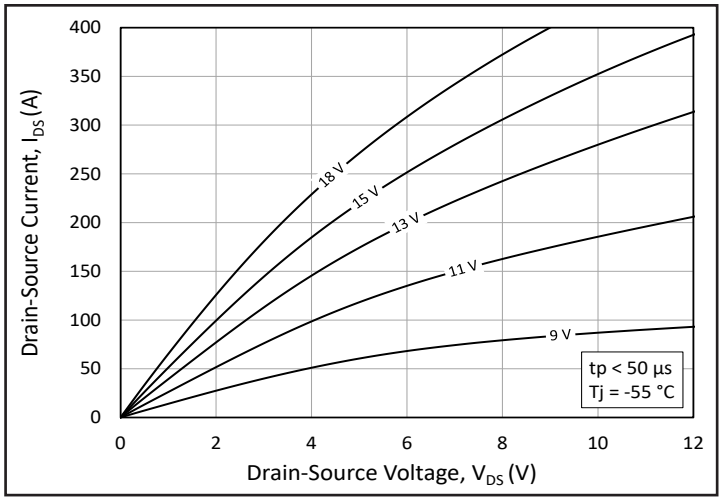


Figure 1. Output Characteristics T_J = -55 ºC

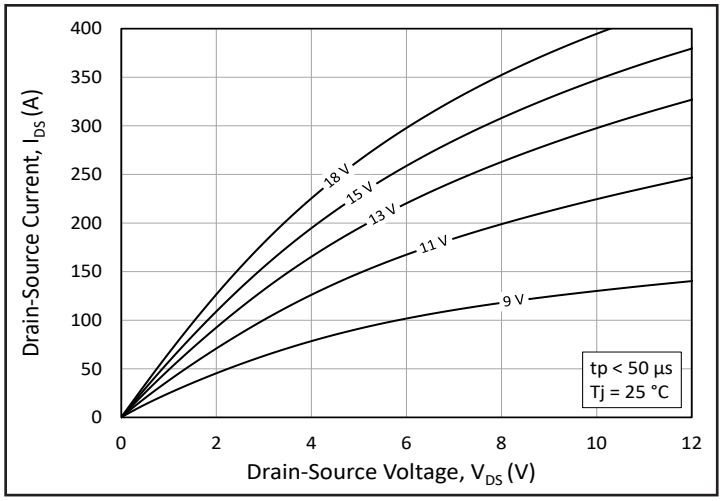


Figure 2. Output Characteristics T_J = 25 ºC

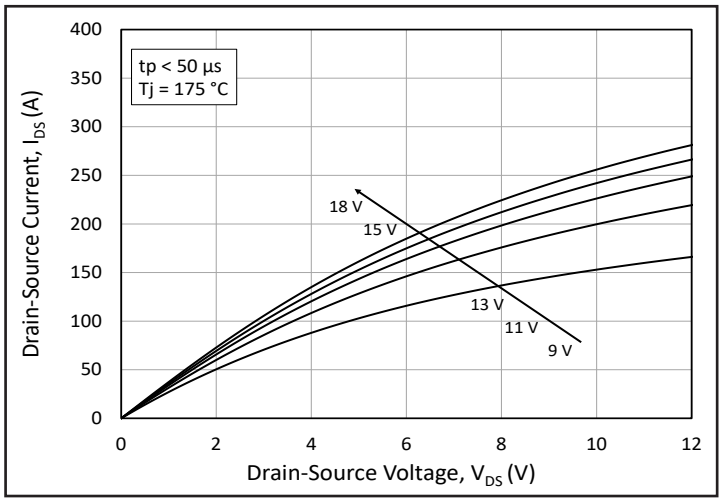


Figure 3. Output Characteristics T_J = 175 ºC

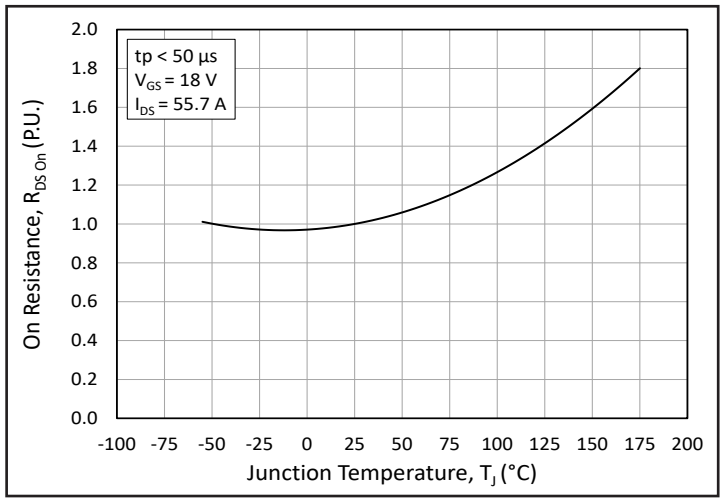


Figure 4. Normalized On-Resistance vs. Temperature

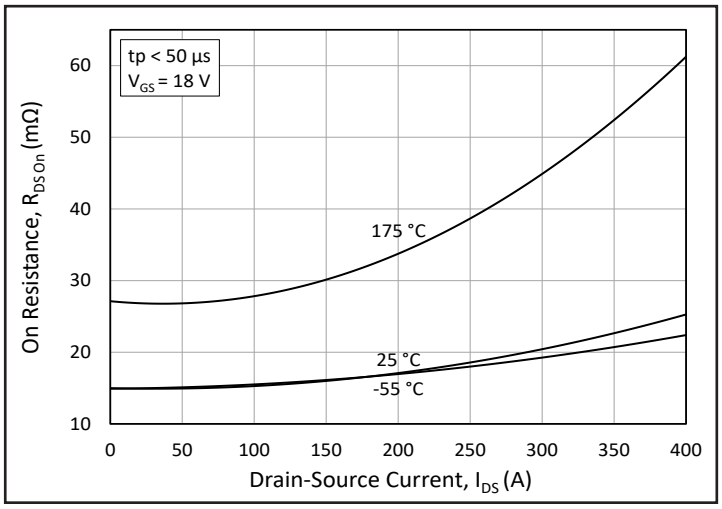


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

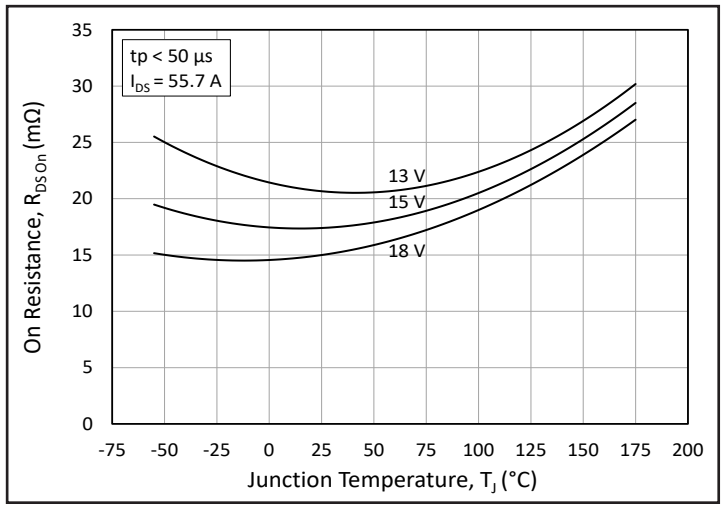


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

Typical Performance

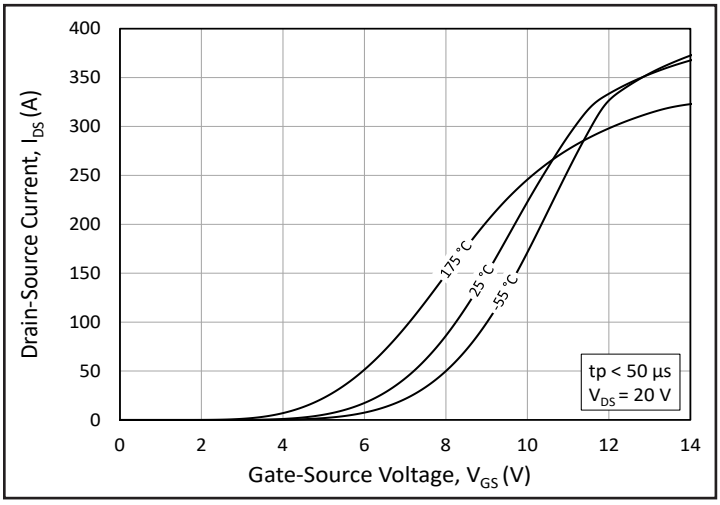


Figure 7. Transfer Characteristic for Various Junction Temperatures

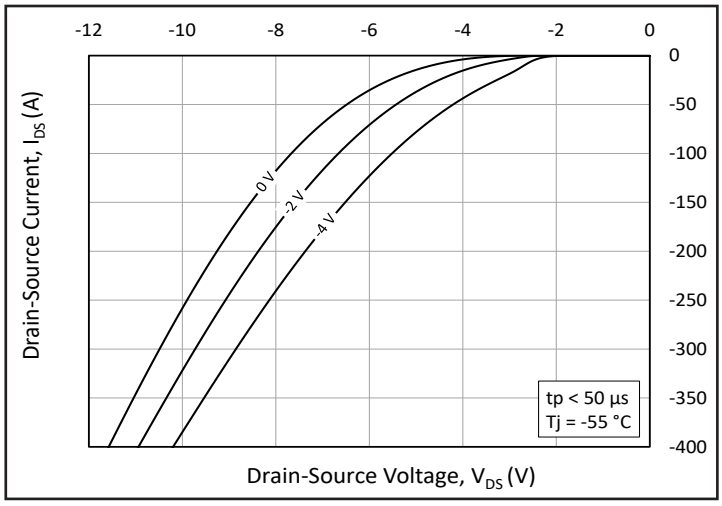


Figure 8. Body Diode Characteristic at -55 ºC

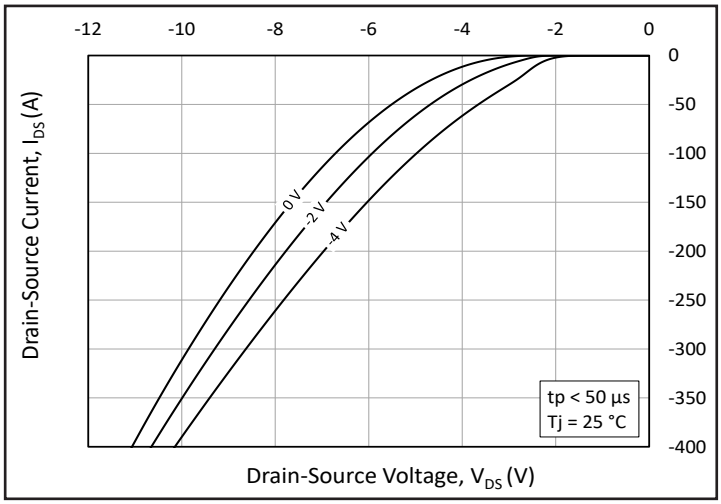


Figure 9. Body Diode Characteristic at 25 ºC

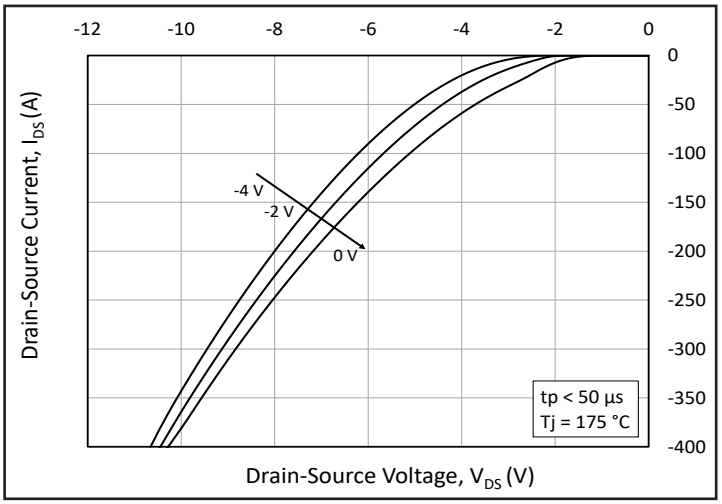


Figure 10. Body Diode Characteristic at 175 ºC

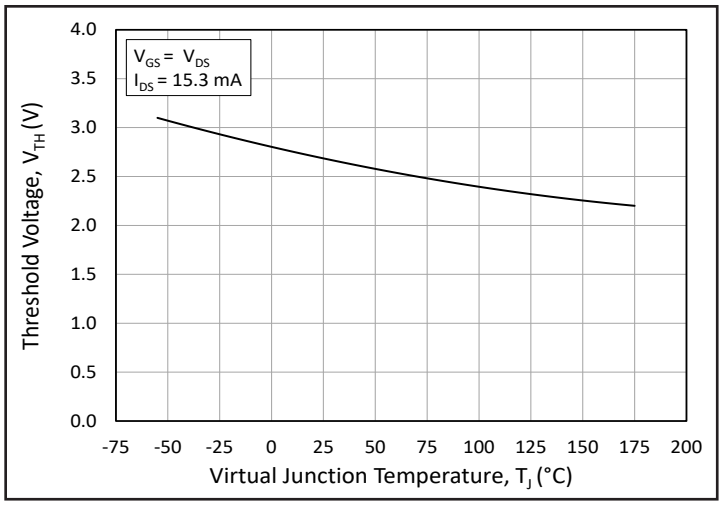


Figure 11. Threshold Voltage vs. Temperature

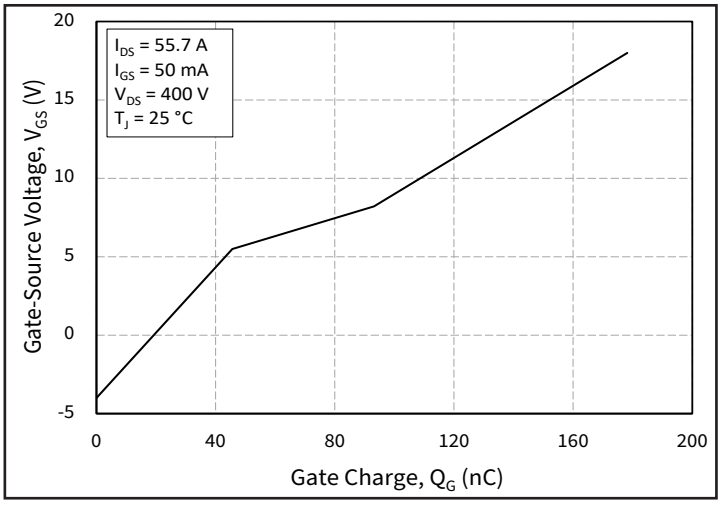


Figure 12. Gate Charge Characteristics

Typical Performance

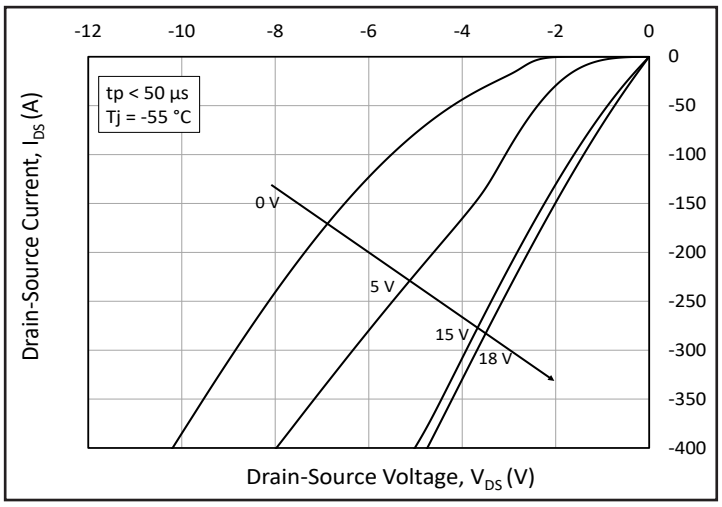


Figure 13. 3rd Quadrant Characteristic at -55 ºC

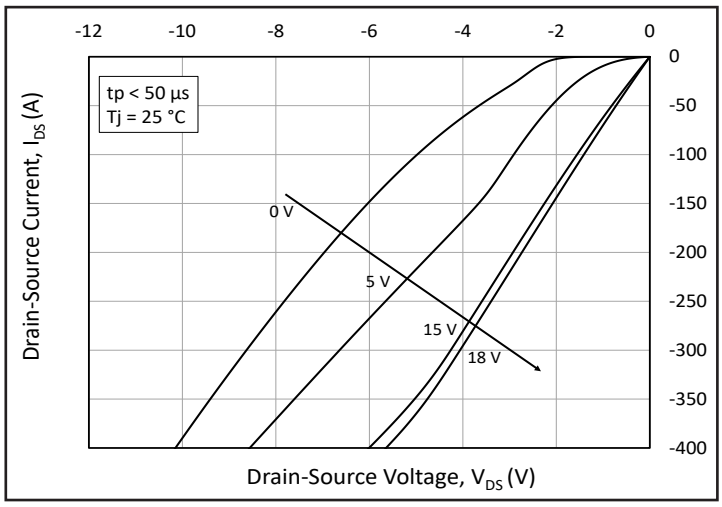


Figure 14. 3rd Quadrant Characteristic at 25 ºC

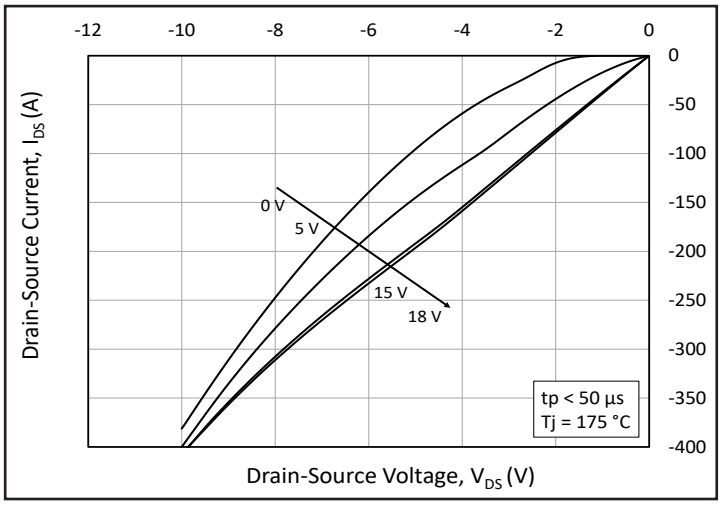


Figure 15. 3rd Quadrant Characteristic at 175 ºC

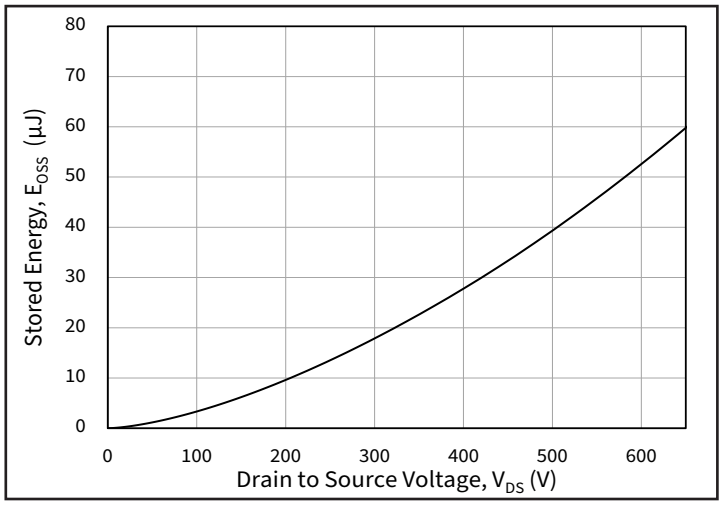


Figure 16. Output Capacitor Stored Energy

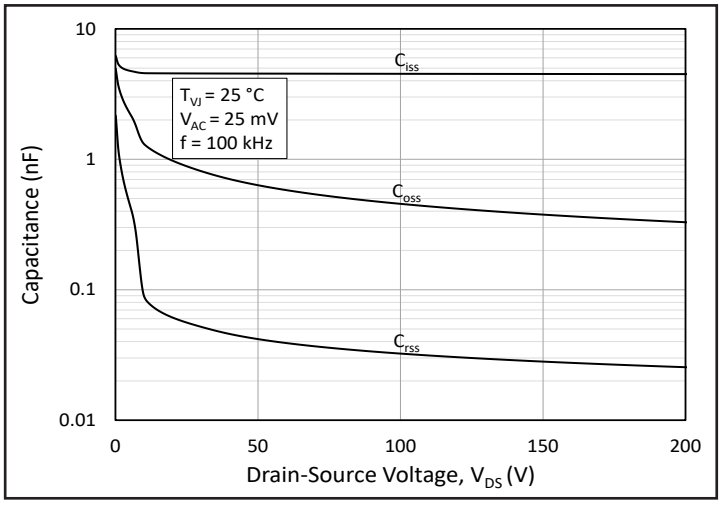


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

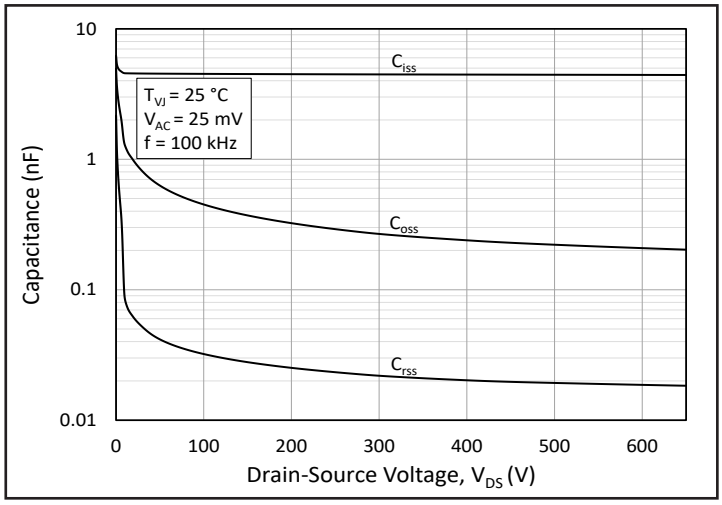


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 650V)

Typical Performance

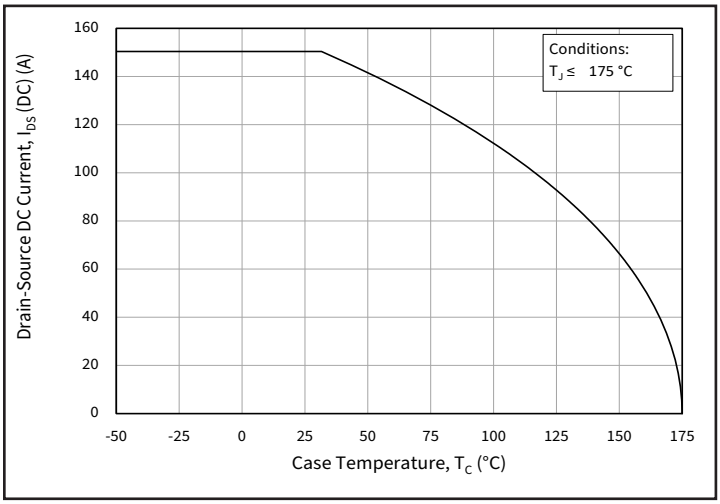


Figure 19. Continuous Drain Current Derating vs. Case Temperature

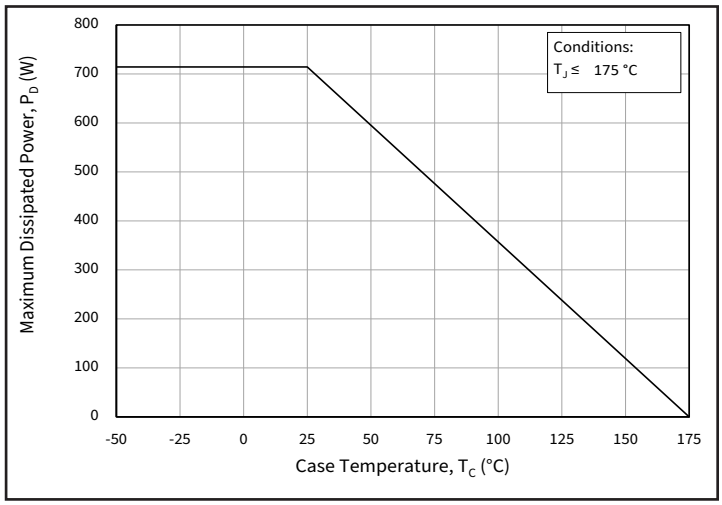


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

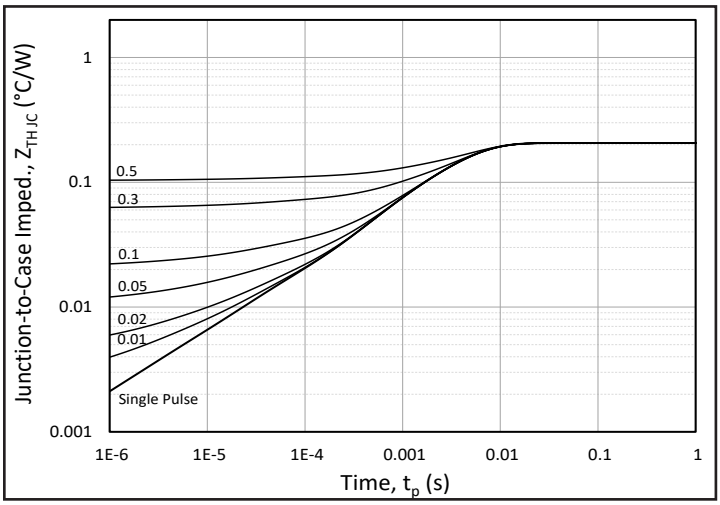


Figure 21. Transient Thermal Impedance (Junction - Case)

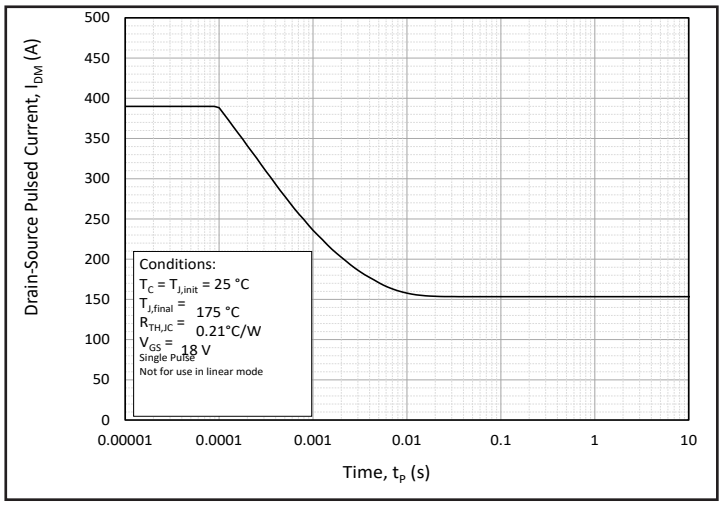


Figure 22. Safe Operating Area

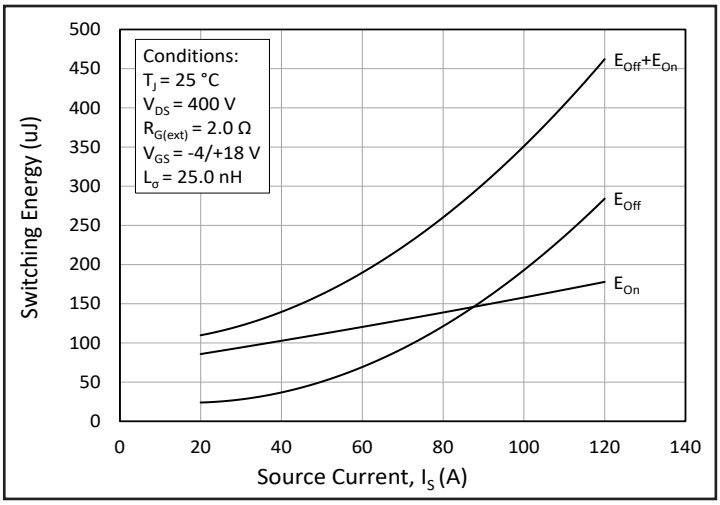


Figure 23. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} = 400V)

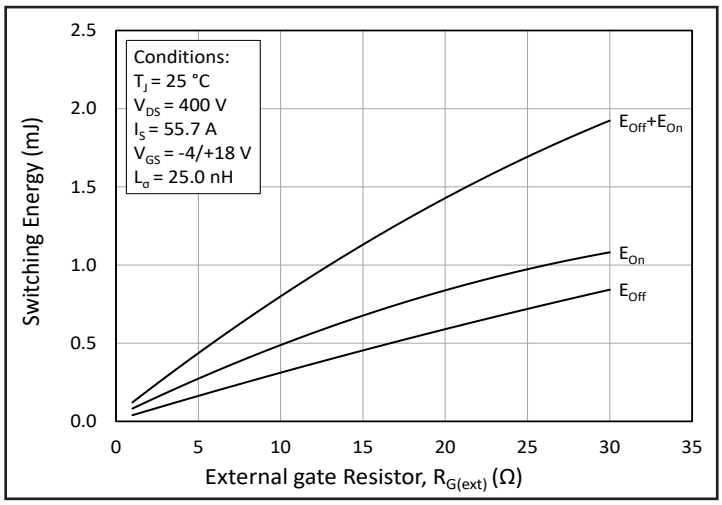


Figure 24. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

Typical Performance

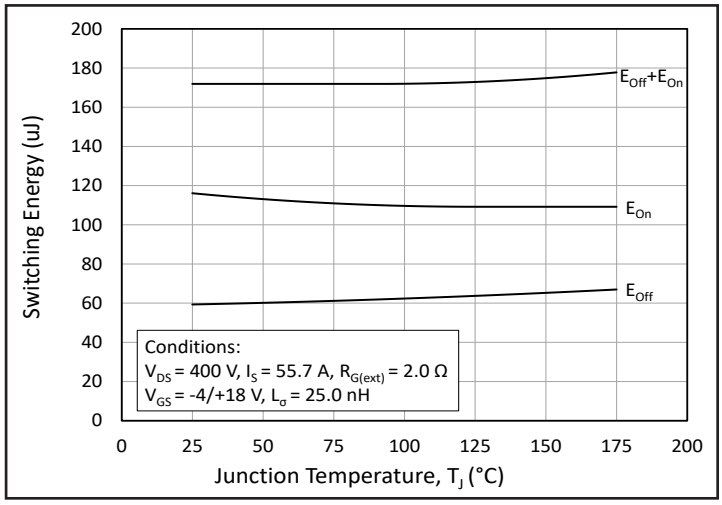


Figure 25. Clamped Inductive Switching Energy vs. Temperature

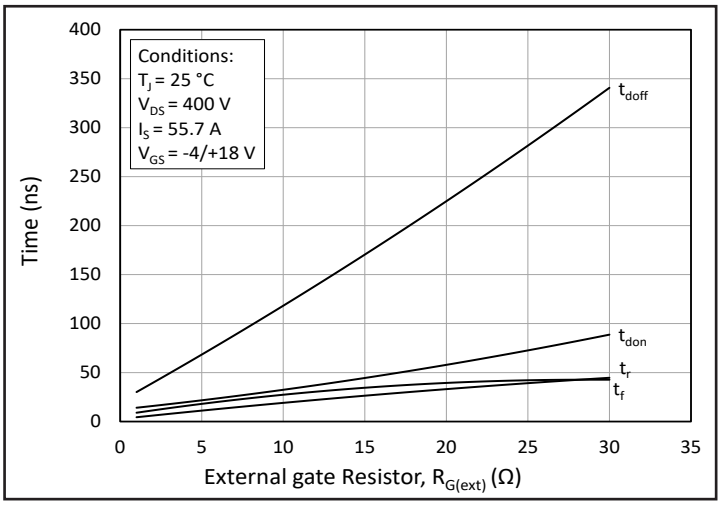


Figure 26. Switching Times vs. $R_{G(ext)}$

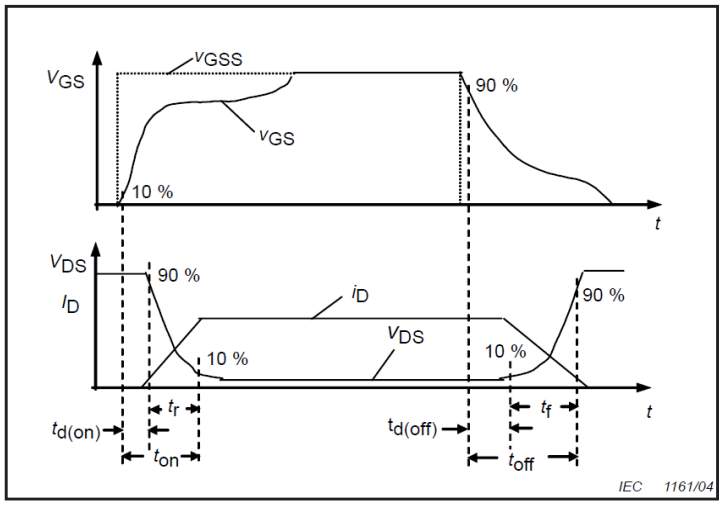


Figure 27. Switching Times Definition

Test Circuit Schematic

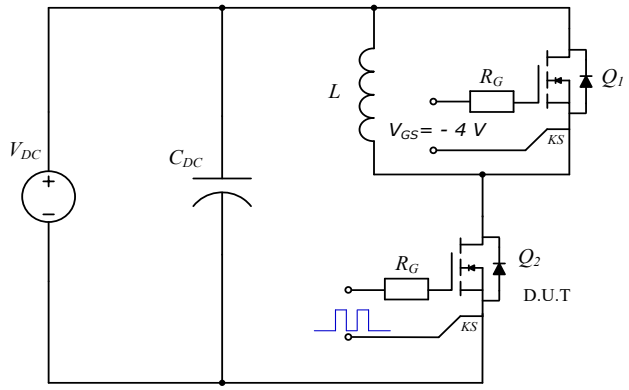
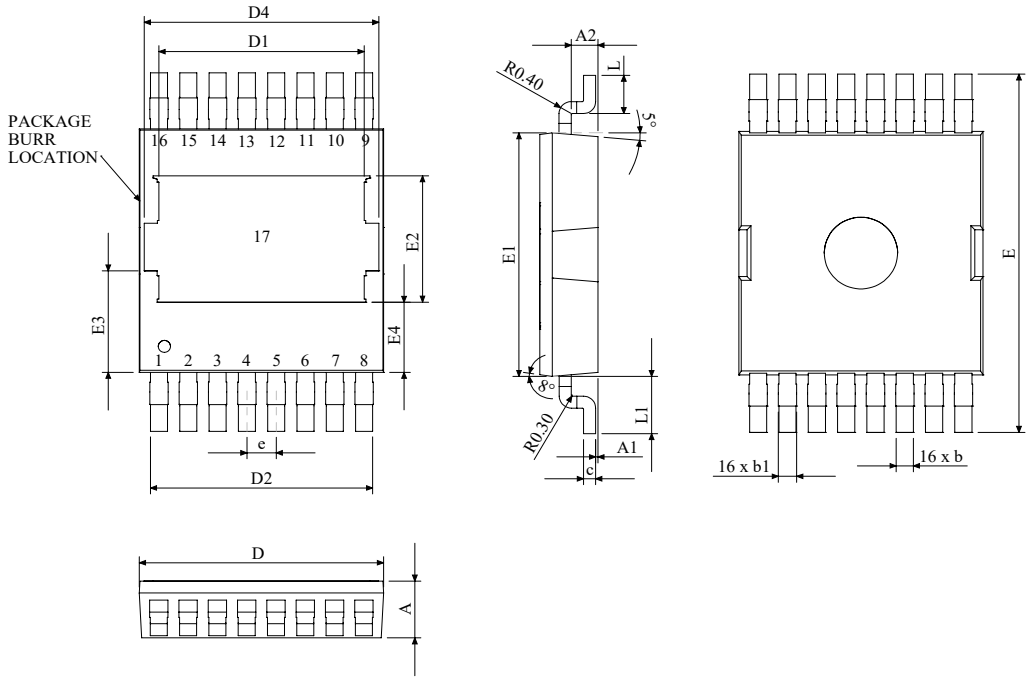


Figure 28. Clamped Inductive Switching Waveform Test Circuit

Package Dimensions



SYMBOL	MIN (mm)	MAX (mm)
A	2.25	2.35
A1	0.01	0.16
A2	0.94	1.14
b	0.60	0.80
b1	0.70	1.00
c	0.40	0.60
D	9.80	10.10
D1	8.31	8.42
D2	8.90	9.30
D4	9.45	9.55
E	14.80	15.20
E1	10.00	10.30
E2	5.63	5.73
E3	3.95	4.15
E4	2.50	2.70
e	1.20 BSC	
L	1.30	1.60
L1	2.35	2.55

1-6	SOURCE
7	KELVIN
8	GATE
9-17	DRAIN

NOTE:
1. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT
2. ALL DIMENSIONS ARE LISTED IN MILLIMETERS. ANGLES IN DEGREES
3. PACKAGE BURR FLASH SIZE (0.5mm) IS NOT INCLUDED IN DIMENSIONS

Wolfspeed

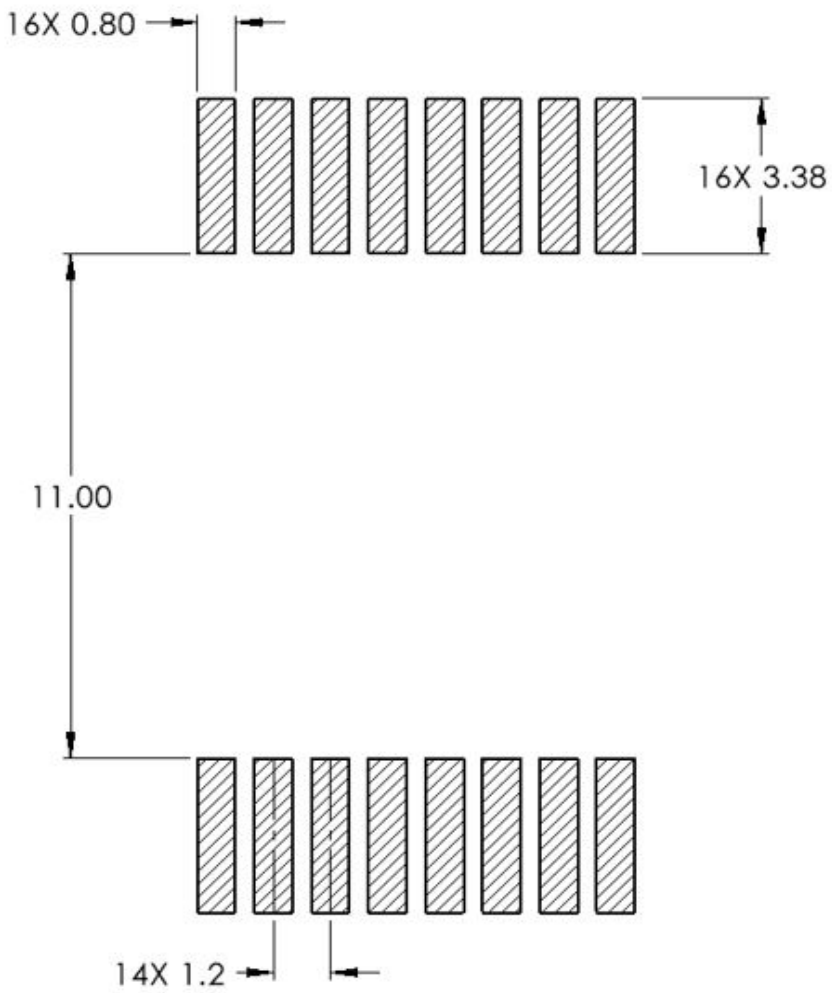
TITLE: PACKAGE OUTLINE DRAWING: TOLT

Date: 3/21/25 | REVISION NO. 01 | A4

PRD 09266 | SCALE:1:1 | SHEET 1 OF 1

Recommended Solder Pad Layout

All dimensions in mm



Revision history

Document Version	Date of release	Descriptiion of changes
1	November 2025	Initial release

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The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Wolfspeed representative or from the Product Documentation sections of www.wolfspeed.com.

REACh Compliance

REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact your Wolfspeed representative to ensure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

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