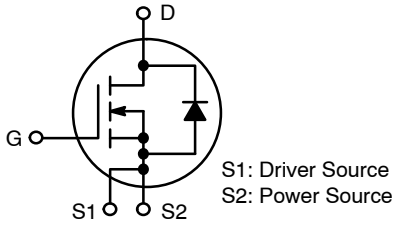
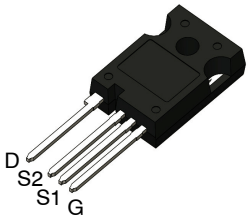
Silicon Carbide (SiC) MOSFET – EliteSiC, 14 mohm, 1200 V, M3P, TO-247-4L

NTH4L014N120M3P

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
1200 V	20 mΩ @ 18 V	152 A



N−CHANNEL MOSFET



TO−247−4L
CASE 340CJ

Features

- Typ. $R_{DS(on)}$ = 14 mΩ @ V_{GS} = 18 V
- Low Switching Losses (Typ. EON 1308 μJ at 74 A, 800 V)
- 100% Avalanche Tested
- These Devices are RoHS Compliant

Typical Applications

- Solar Inverters
- Electric Vehicle Charging Stations
- UPS (Uninterruptible Power Supplies)
- Energy Storage Systems
- SMPS (Switch Mode Power Supplies)

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	1200	V
Gate−to−Source Voltage			V_{GS}	−10/+22	V
Continuous Drain Current (Notes 1, 2)	Steady State	T_C = 25°C	I_D	152	A
Power Dissipation (Note 1)	Steady State	T_C = 25°C	P_D	686	W
Continuous Drain Current (Notes 1, 2)	Steady State	T_C = 100°C	I_D	107	A
Power Dissipation (Note 1)	Steady State	T_C = 100°C	P_D	343	W
Pulsed Drain Current (Note 2)		T_C = 25°C	I_{DM}	407	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode) T_C = 25°C, V_{GS} = −3 V			I_S	129	A
Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 28.9 A, L = 1 mH) (Note 4)			E_{AS}	418	mJ
Maximum Lead Temperature for Soldering (1/25″ from case for 10 s)			T_L	270	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. The maximum current rating is based on typical $R_{DS(on)}$ performance.
3. Repetitive rating, limited by max junction temperature.
4. EAS of 418 mJ is based on starting T_J = 25°C; L = 1 mH, I_{AS} = 28.9 A, V_{DD} = 100 V, V_{GS} = 18 V.

MARKING DIAGRAM



H4L014120M3P = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping
NTH4L014N120M3P	TO−247−4L	30 Units / Tube

© Semiconductor Components Industries, LLC, 2021

THERMAL CHARACTERISTICS

Parameter	Symbol	Typ	Max	Unit
Junction−to−Case − Steady State (Note 1)	$R_{\theta JC}$	0.17	0.22	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$		40	

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Operation Values of Gate−to−Source Voltage	V_{GSop}	−5…−3 +18	V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF−STATE CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA	1200	−	−	V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 1 mA, referenced to 25°C (Note 6)	−	0.3	−	V/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V, T_J = 25°C	−	−	100	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{GS} = +22/−10 V, V_{DS} = 0 V	−	−	±1	μA
ON−STATE CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 37 mA	2.08	3.0	4.63	V
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 18 V, I_D = 74 A, T_J = 25°C	−	14	20	mΩ
		V_{GS} = 18 V, I_D = 74 A, T_J = 175°C (Note 6)	−	29	−	
		V_{GS} = 15 V, I_D = 74 A, T_J = 25°C	−	16	27	
		V_{GS} = 15 V, I_D = 74 A, T_J = 150°C (Note 6)	−	27	−	
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 74 A (Note 6)	−	29	−	S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 800 V (Note 6)	−	6230	−	pF
Output Capacitance	C_{OSS}		−	262	−	
Reverse Transfer Capacitance	C_{RSS}		−	29	−	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −3/18 V, V_{DS} = 800 V, I_D = 74 A (Note 6)	−	322	−	nC
Threshold Gate Charge	$Q_{G(TH)}$		−	45	−	
Gate−to−Source Charge	Q_{GS}		−	51	−	
Gate−to−Drain Charge	Q_{GD}		−	81	−	
Gate−Resistance	R_G	f = 1 MHz	−	1.4	−	Ω
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = −3/18 V, V_{DS} = 800 V, I_D = 74 A, R_G = 2 Ω inductive load (Notes 5, 6)	−	26	−	ns
Rise Time	t_r		−	40	−	
Turn−Off Delay Time	$t_{d(OFF)}$		−	68	−	
Fall Time	t_f		−	13	−	
Turn−On Switching Loss	E_{ON}		−	1308	−	μJ
Turn−Off Switching Loss	E_{OFF}		−	601	−	
Total Switching Loss	E_{tot}		−	1909	−	

Share Feedback
Your Opinion Matters

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified) (continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
SOURCE−DRAIN DIODE CHARACTERISTICS						
Continuous Source−Drain Diode Forward Current (Note 1)	I_{SD}	V_{GS} = −3 V, T_C = 25°C (Note 6)	−	−	127	A
Pulsed Source−Drain Diode Forward Current (Note 2)	I_{SDM}		−	−	407	
Forward Diode Voltage	V_{SD}	V_{GS} = −3 V, I_{SD} = 74 A, T_J = 25°C	−	5.2	−	V
Reverse Recovery Time	t_{RR}	V_{GS} = −3/18 V, I_{SD} = 74 A, dI_S/dt = 1000 A/μs, V_{DS} = 800 V (Note 6)	−	36	−	ns
Reverse Recovery Charge	Q_{RR}		−	332	−	nC
Reverse Recovery Energy	E_{REC}		−	14	−	μJ
Peak Reverse Recovery Current	I_{RRM}		−	19	−	A
Charge time	T_A		−	20	−	ns
Discharge time	T_B		−	16	−	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. E_{ON}/E_{OFF} result is with body diode
6. Defined by design, not subject to production test.

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS

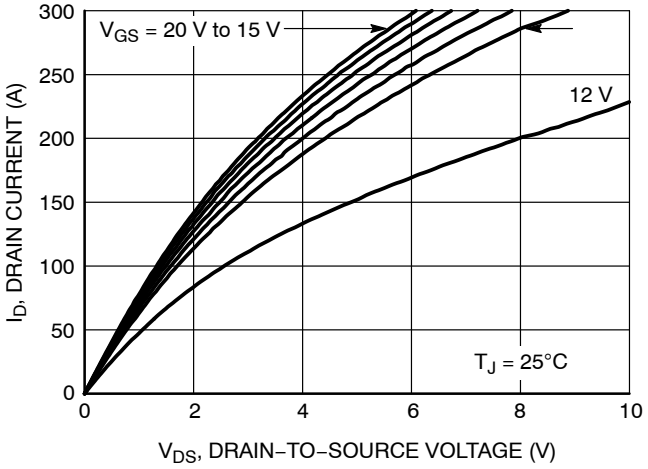


Figure 1. On−Region Characteristics

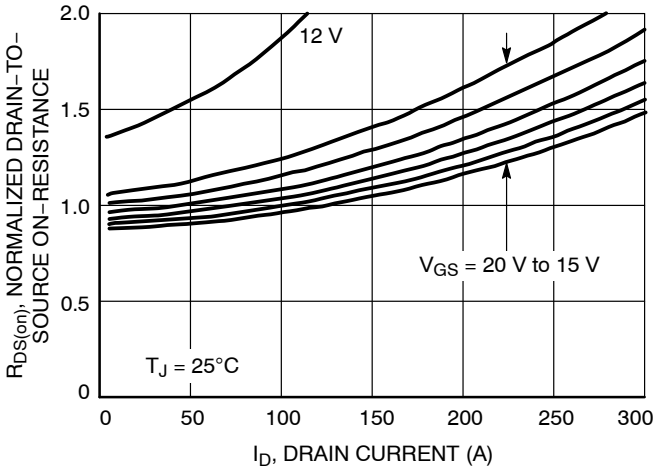


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

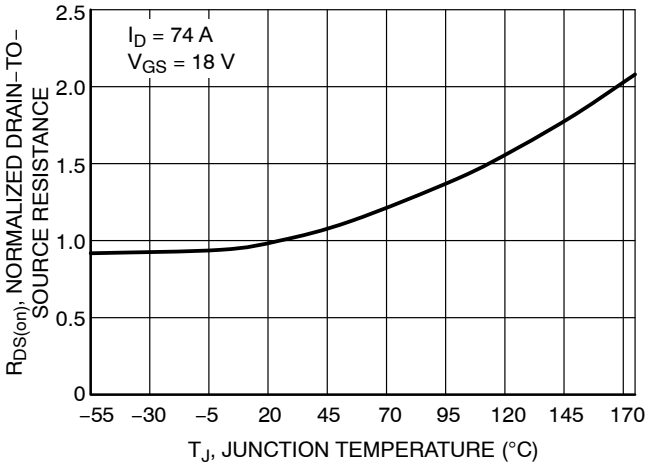


Figure 3. On−Resistance Variation with Temperature

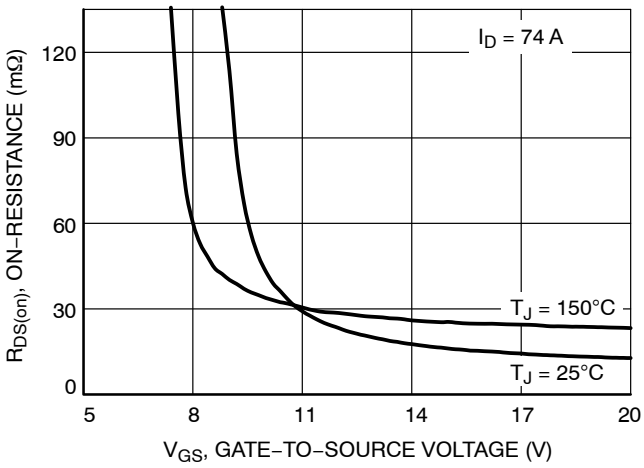


Figure 4. On−Resistance vs. Gate−to−Source Voltage

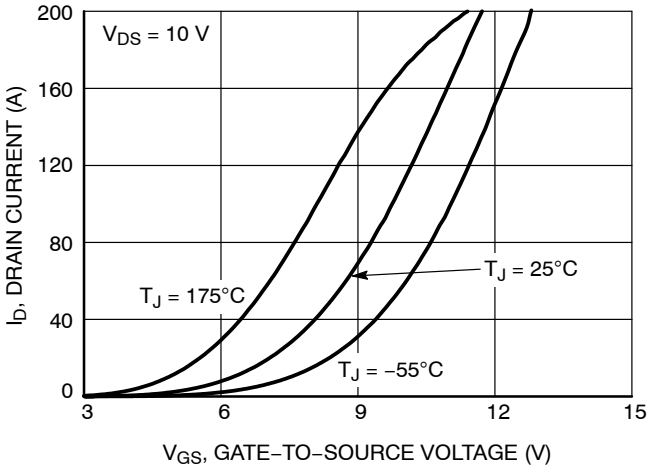


Figure 5. Transfer Characteristics

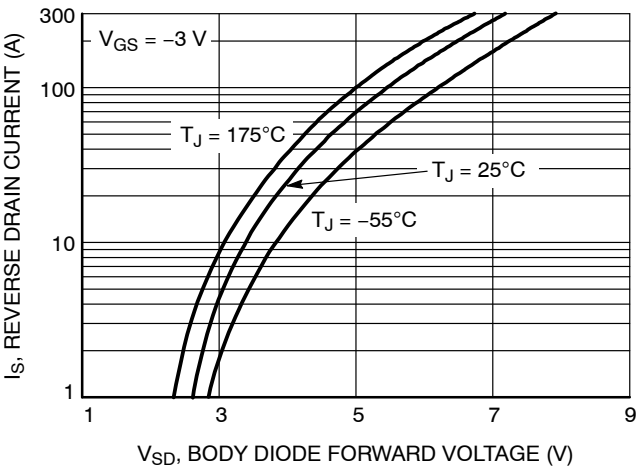


Figure 6. Diode Forward Voltage vs. Current

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS

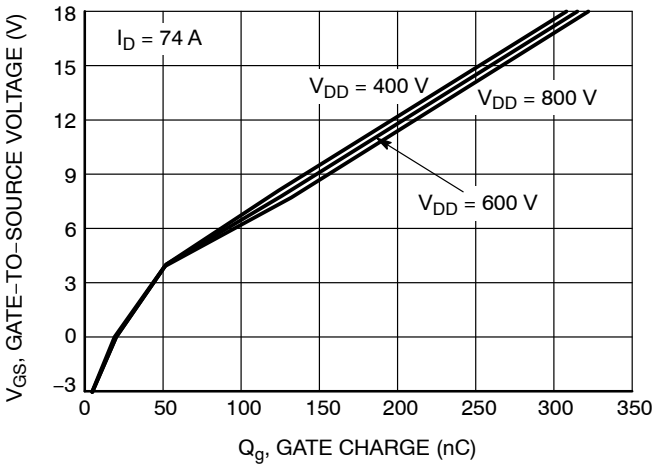


Figure 7. Gate−to−Source Voltage vs. Total Charge

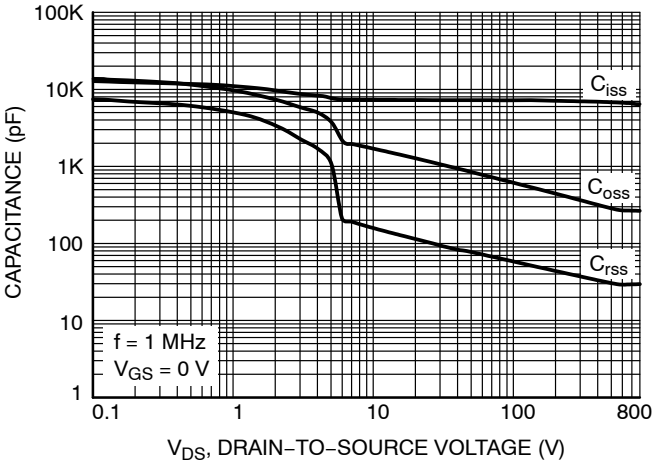


Figure 8. Capacitance vs. Drain−to−Source Voltage

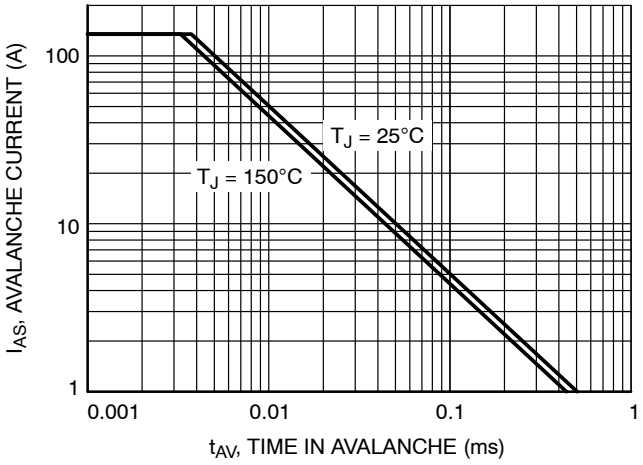


Figure 9. Unclamped Inductive Switching Capability

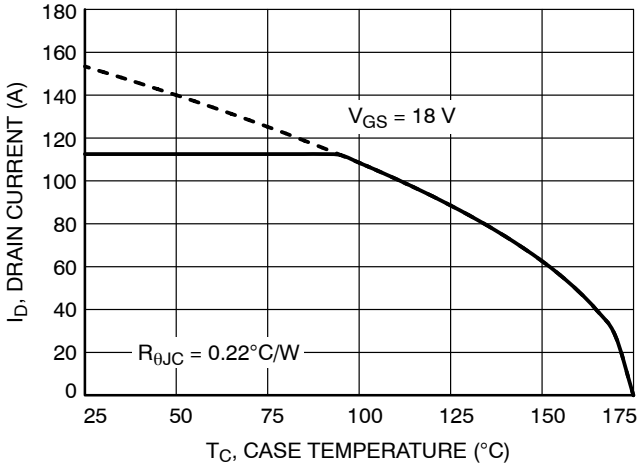


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

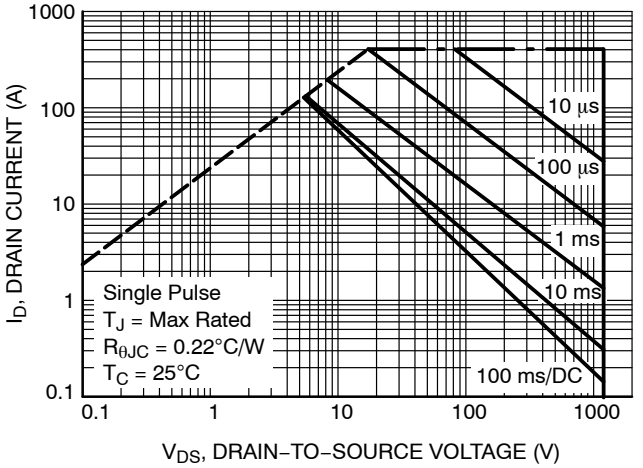


Figure 11. Safe Operating Area

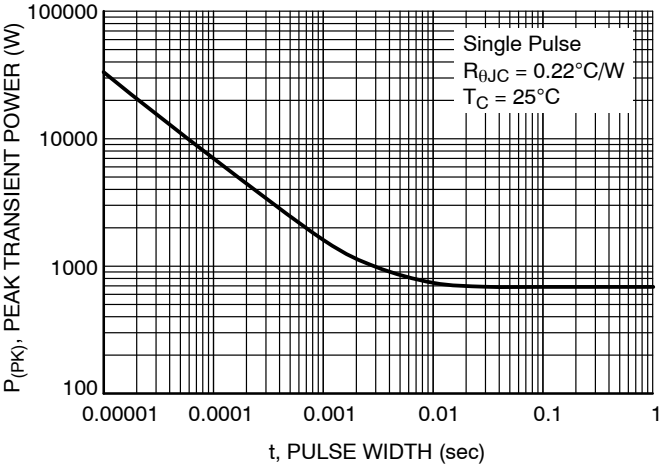


Figure 12. Single Pulse Maximum Power Dissipation

Share Feedback
Your Opinion Matters

TYPICAL CHARACTERISTICS

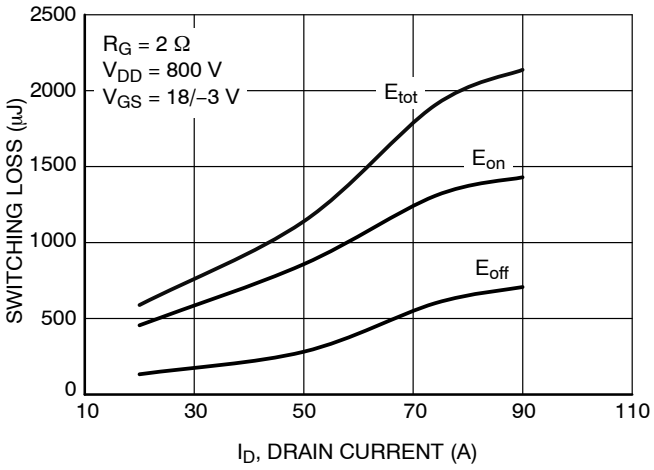


Figure 13. Switching Loss vs. Drain Current

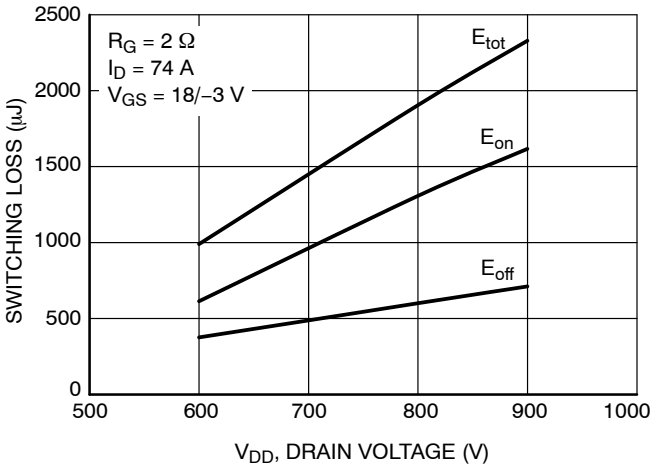


Figure 14. Switching Loss vs. Drain Voltage

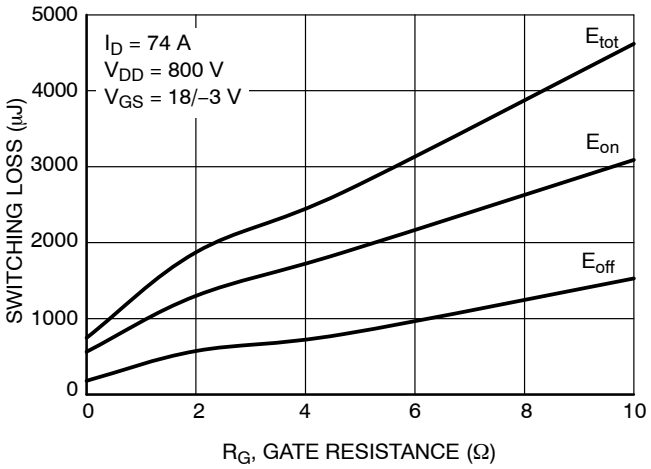


Figure 15. Switching Loss vs. Gate Resistance

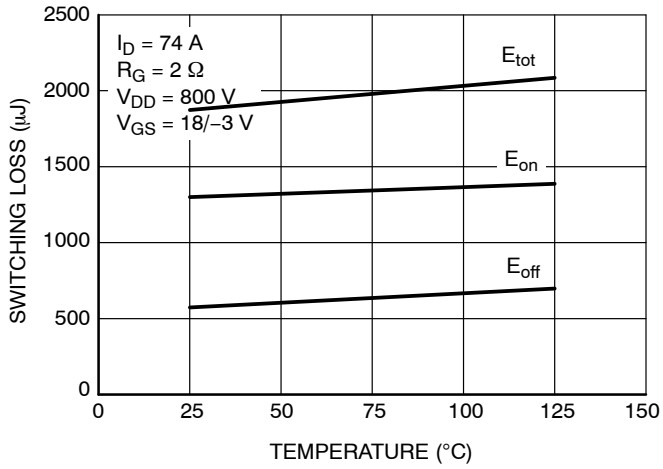


Figure 16. Switching Loss vs. Temperature

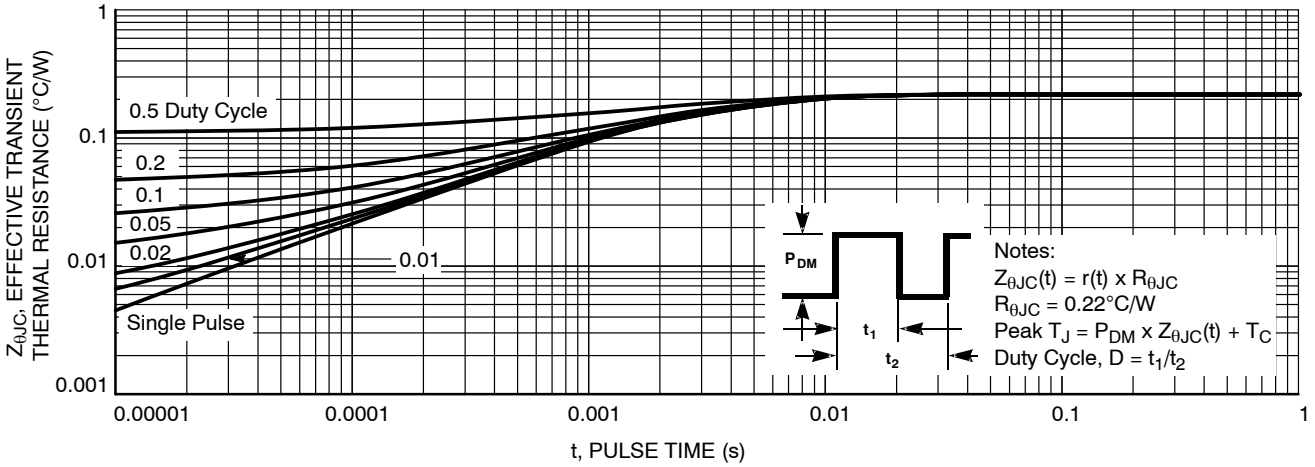
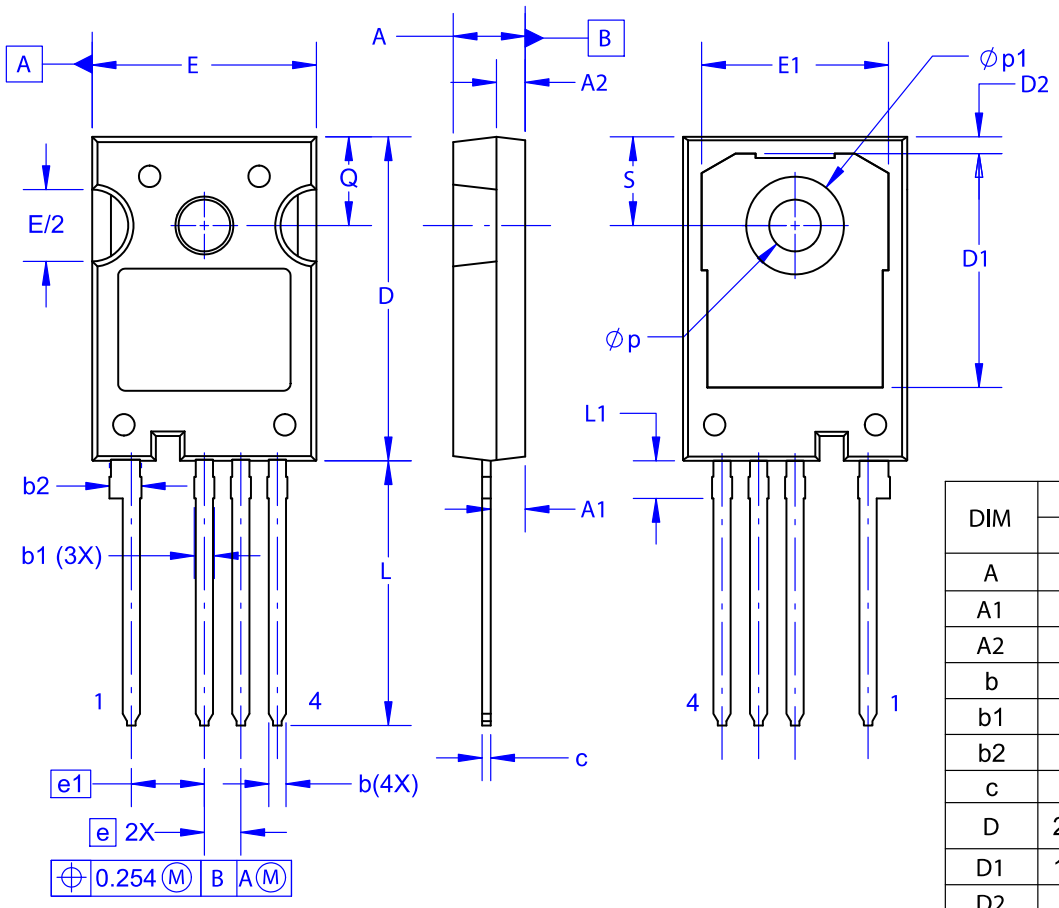


Figure 17. Junction−to−Case Transient Thermal Response

Share Feedback
Your Opinion Matters

TO−247−4LD
CASE 340CJ
ISSUE A

DATE 16 SEP 2019



NOTES:

A. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE.
B. DIMENSIONS ARE EXCLUSIVE OF BURRS,MOLD FLASH,AND TIE BAR EXTRUSIONS.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DRAWING CONFORMS TO ASME Y14.5-2009.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.10	2.40	2.70
A2	1.80	2.00	2.20
b	1.07	1.20	1.33
b1	1.20	1.40	1.60
b2	2.02	2.22	2.42
c	0.50	0.60	0.70
D	22.34	22.54	22.74
D1	16.00	16.25	16.50
D2	0.97	1.17	1.37
e	2.54 BSC		
e1	5.08 BSC		
E	15.40	15.60	15.80
E1	12.80	13.00	13.20
E/2	4.80	5.00	5.20
L	18.22	18.42	18.62
L1	2.42	2.62	2.82
p	3.40	3.60	3.80
p1	6.60	6.80	7.00
Q	5.97	6.17	6.37
S	5.97	6.17	6.37

DOCUMENT NUMBER:	**98AON13852G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**TO−247−4LD**	**PAGE 1 OF 1**

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.