

## Silicon Carbide Enhancement Mode MOSFET

### Features

- High switching speed with a low gate charge
- Fast intrinsic diode with low reverse recovery
- Simple to drive with -5V/+18V gate
- Increased power density
- Pb-free, Halogen Free, and RoHS Compliant

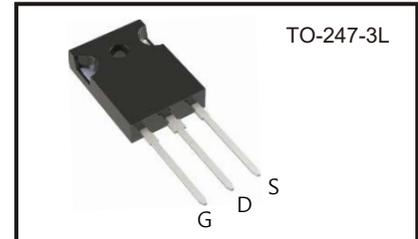
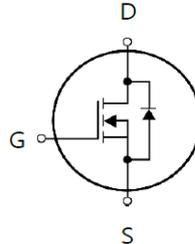
### Benefits

- Lower capacitance
- Higher system efficiency
- Easy to parallel

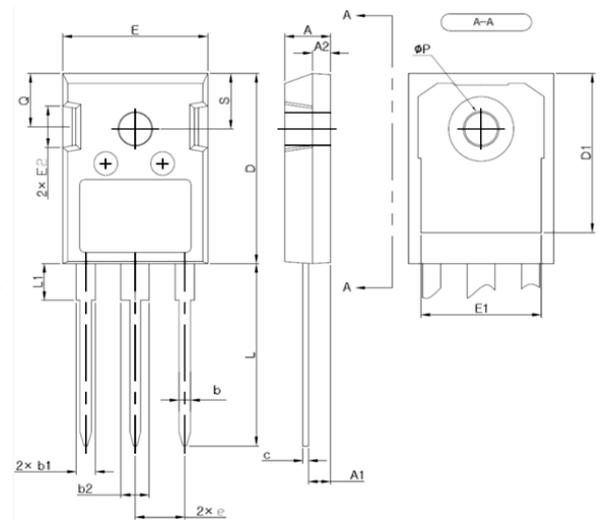
### Applications

- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating
- Motor drives

$V_{DSS}$	1200V
$I_D(@25^{\circ}C)$	30A
$R_{DS(ON)}$ typ.	80m $\Omega$



Package Dimensions



Unit : mm

Symbol	Min	Max
A	4.80	5.20
A1	2.29	2.54
A2	1.90	2.10
b	1.10	1.30
b1	1.91	2.20
b2	2.92	3.20
c	0.50	0.70
D	20.80	21.34
D1	17.43	17.83
E	15.75	16.13
E1	13.06	13.46
E2	4.32	4.83
e	5.45 BSC	
L	19.85	20.25
L1	-	4.49
phi P	3.55	3.65
Q	5.59	6.19
S	6.15 BSC	

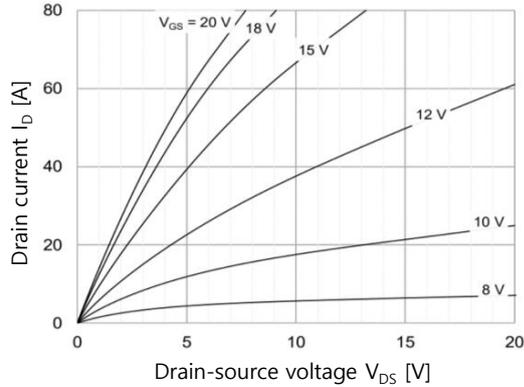
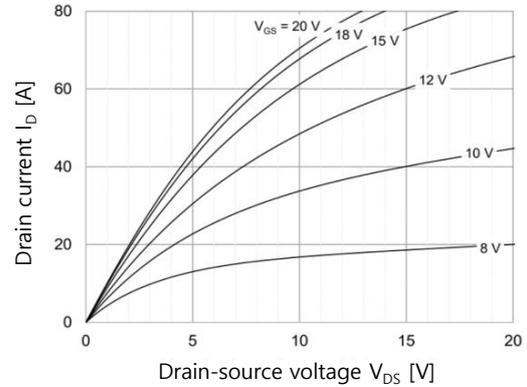
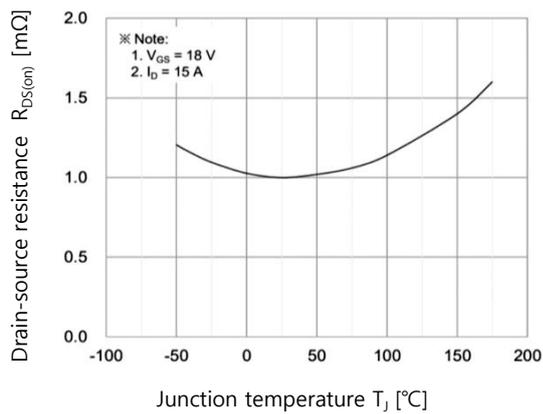
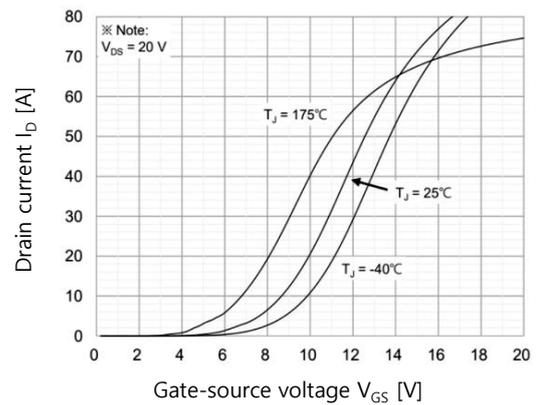
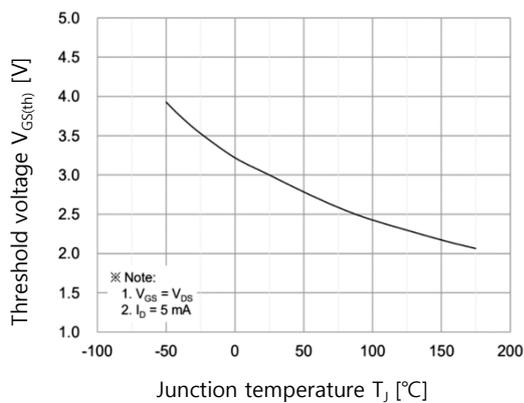
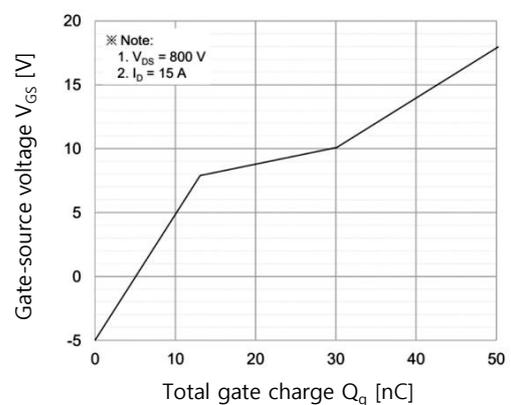
### Absolute Maximum Ratings

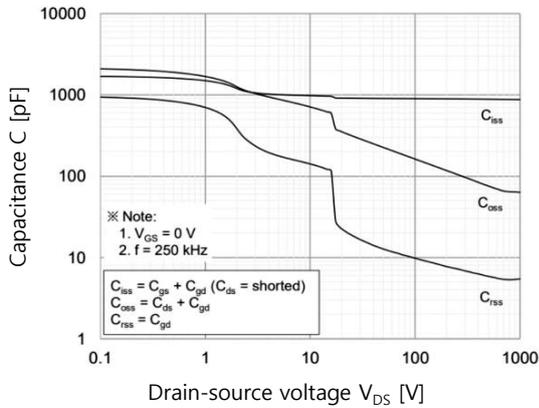
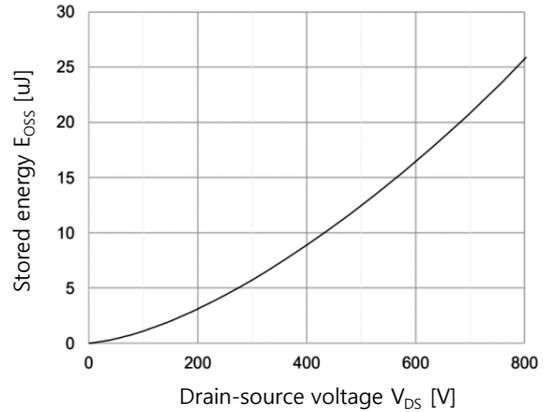
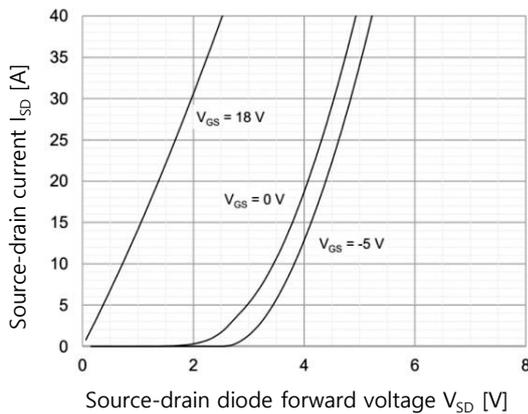
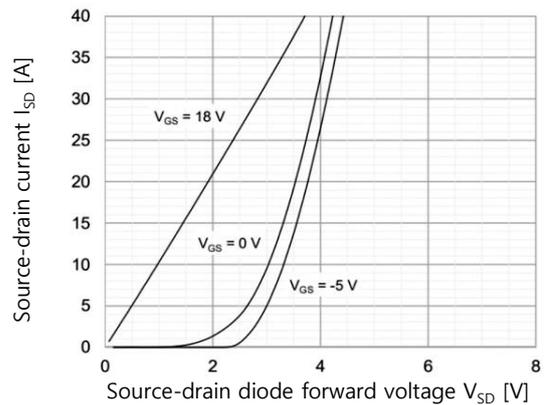
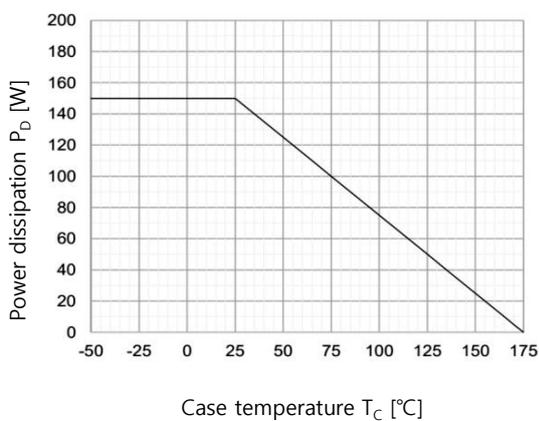
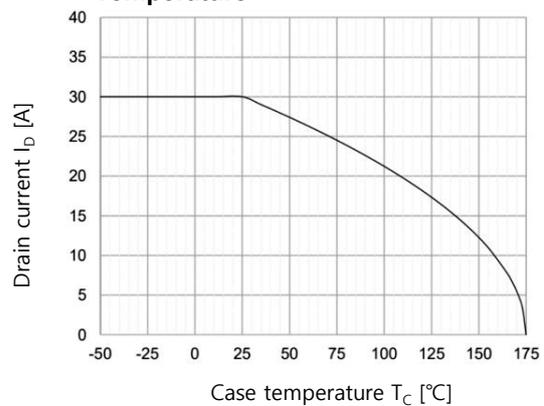
(T<sub>c</sub> = 25°C unless otherwise specified)

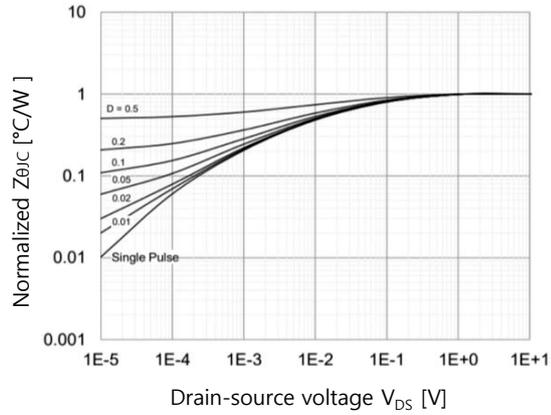
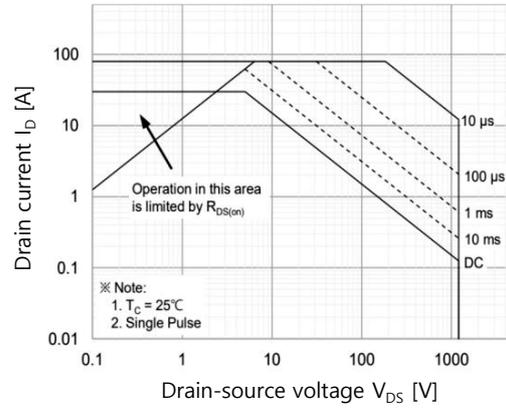
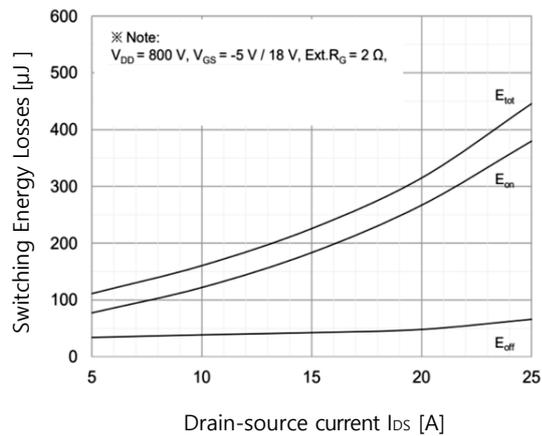
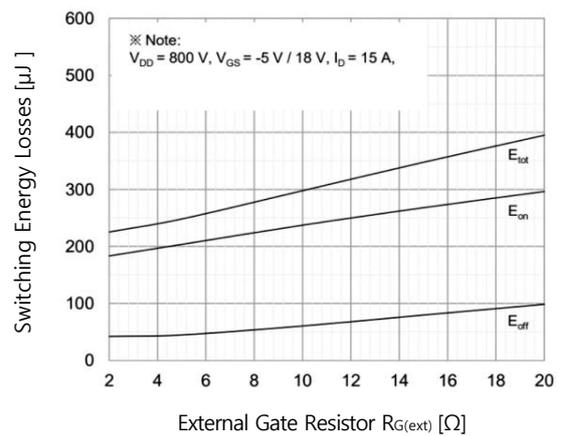
Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	1200	V
Gate - Source Voltage (DC)	$V_{GS}$	-10/+22	V
Recommended Operation Value	$V_{GS(op)}$	-5/+18	V
Drain Current-Continuous	$I_D$	30 21	A
		T <sub>c</sub> =25°C T <sub>c</sub> =100°C	
Pulse Drain Current	$I_{DM}$	80	A
Total Power Dissipation	$P_D$	150	W
Storage Temperature Range	$T_{STG}$	-55 to +175	°C
Operating Junction Temperature Range	$T_J$	-55 to +175	°C

**Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>OFF Characteristics</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=1mA$	1200	-	-	V	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=1200V$ $V_{GS}=0V$	$T_J=25^\circ\text{C}$	-	1	50	$\mu\text{A}$
			$T_J=150^\circ\text{C}$	-	5	200	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=22V, V_{DS}=0V$	-	-	100	nA	
		$V_{GS}=-10V, V_{DS}=0V$	-	-	-100		
<b>ON Characteristics</b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=5mA$	2.0	3.0	4.5	V	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=15A$	$T_J=25^\circ\text{C}$	-	80	100	m $\Omega$
			$T_J=175^\circ\text{C}$	-	128	-	
Internal Gate Resistance	$R_{G(int.)}$	$f=1MHz, V_{AC}=25mV$	-	4.0	-	$\Omega$	
<b>Dynamic Characteristics</b>							
Input Capacitance	$C_{iss}$	$V_{DS}=800V$ $V_{GS}=0V$ $f=250kHz$	-	890	-	pF	
Output Capacitance	$C_{oss}$		-	65	-		
Reverse Transfer Capacitance	$C_{rss}$		-	6	-		
Turn-On Switching Energy	$E_{on}$	$V_{DD}=800V$ $V_{GS}=-5/+18V$ $I_D=15A$ $R_{G(ext)}=2.0\Omega$	-	186	-	$\mu\text{J}$	
Turn-Off Switching Energy	$E_{off}$		-	46	-		
Total Switching Energy	$E_{tot}$		-	232	-		
<b>Switching Characteristics</b>							
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=800V$ $V_{GS}=-5/+18V$ $I_D=15A$ $R_{G(ext)}=2.0\Omega$	-	16	-	ns	
Rise Time	$t_r$		-	23	-		
Turn-Off Delay Time	$t_{d(off)}$		-	26	-		
Fall Time	$t_f$		-	10	-		
Total Gate Charge	$Q_g$	$V_{DD}=800V$ $V_{GS}=-5/+18V$ $I_D=15A$	-	53	-	nC	
Gate to Source Charge	$Q_{gs}$		-	15	-		
Gate to Drain Charge	$Q_{gd}$		-	18	-		
<b>Body Diode Characteristics</b>							
Diode Forward Voltage	$V_{SD}$	$V_{GS}=-5V, I_{SD}=15A$	-	4.1	-	V	
Diode Source Current	$I_S$		-	-	30	A	
Maximum Diode Source Current (DC)	$I_{SM}$		-	-	80	A	
Reverse Recovery Time	$T_{rr}$	$I_{SD}=15A, V_{DD}=800V$ $diF/dt=1000A/\mu\text{s}$	-	34	-	ns	
Reverse Recovery Charge	$Q_{rr}$		-	112	-	nC	
<b>Thermal Resistance</b>							
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		-	-	1.0	$^\circ\text{C/W}$	

**Typical Performance**
**Fig 1. Output Characteristics,  $T_J = 25^\circ\text{C}$** 

**Fig 2. Output Characteristics,  $T_J = 175^\circ\text{C}$** 

**Fig 3. On-Resistance Variation vs. Temperature**

**Fig 4. Transfer Characteristics**

**Fig 5. Threshold Voltage vs. Temperature**

**Fig 6. Gate Charge Characteristics**


**Typical Performance**
**Fig 7. Capacitance Characteristics**

**Fig 8. Stored Energy in Output Capacitance**

**Fig 9. Body Diode Characteristics @ 25°C**

**Fig 10. Body Diode Characteristics @ 175°C**

**Fig 11. Max. P\_D Derating VS Case Temperature**

**Fig 12. Continuous I\_D Derating VS Case Temperature**


**Typical Performance**
**Fig 13. Transient Thermal Impedance**

**Fig 14. Safe Operating Area**

**Fig 15. Clamped Inductive Switching Energy vs Drain Current**

**Fig 16. Clamped Inductive Switching Energy vs External Gate Resistor  $R_{G(ext)}$** 


### **Disclaimer**

DACO Semiconductor reserves the right to make modifications, enhancements, improvements, corrections, or other changes to this document and any product described herein without prior notice. For the most up-to-date version, please visit our website.

DACO Semiconductor makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does DACO Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any liability, including without limitation special, consequential or incidental damages.

Purchasers are responsible for its products and applications using DACO Semiconductor products, including compliance with all laws, regulations, and safety requirements or standards, regardless of any support or application information provided by DACO Semiconductor. "Typical" parameters that may be provided in DACO Semiconductor datasheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typical" must be validated for each customer application by the customer's technical experts.

DACO Semiconductor products are not designed, authorized, or warranted to be suitable for use in life support, life-critical or safety-critical systems, or equipment, nor in applications where failure or malfunction of DACO Semiconductor's product can reasonably be expected to result in personal injury, death or severe property or environmental damage. DACO Semiconductor accepts no liability for the inclusion and/or use of DACO Semiconductor's products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Purchasers who buy or use DACO Semiconductor products for any unintended or unauthorized applications are required to indemnify and absolve DACO Semiconductor, its suppliers, and distributors from any claims, costs, damages, 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 DACO Semiconductor was negligent regarding the design or manufacture of the part.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage and retrieval system, or otherwise, without the prior written permission of DACO Semiconductor Co., Ltd.