

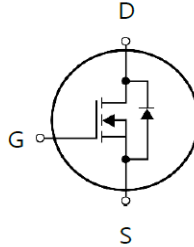
## Silicon Carbide Enhancement Mode MOSFET

### Features

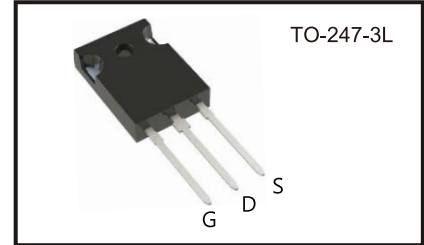
- Low Capacitance With High Speed Switching Speed
- Low Reverse Recovery (Qrr)
- Reduction of Heat Sink Requirements
- Halogen Free, and RoHS Compliant

### Benefits

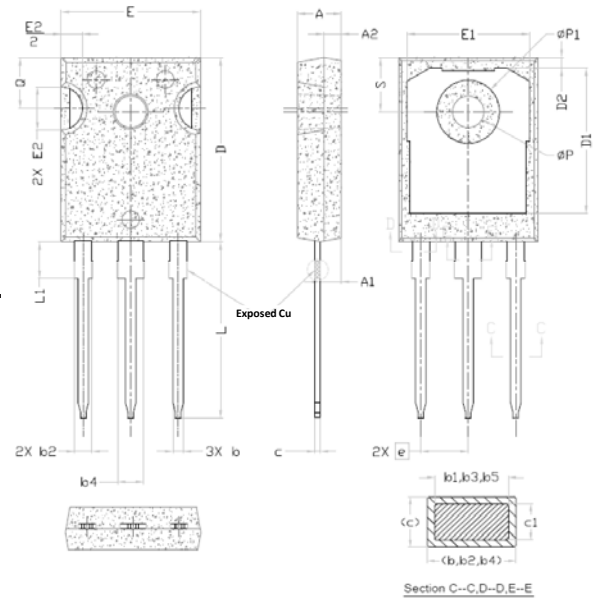
- Increase Parallel Device Convenience
- Higher System Efficiency
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems



$V_{DSS}$	650V
$I_D(@25^{\circ}C)$	70A
$R_{DS(ON) \text{ typ.}}$	35.5m $\Omega$



Package Dimensions



### Applications

- EV Motor Drive
- High voltage DC/DC Converters
- Switched Mode Power Supplies
- Load Switch
- Solar/Wind Renewable Energy
- Power Inverters

### Absolute Maximum Ratings

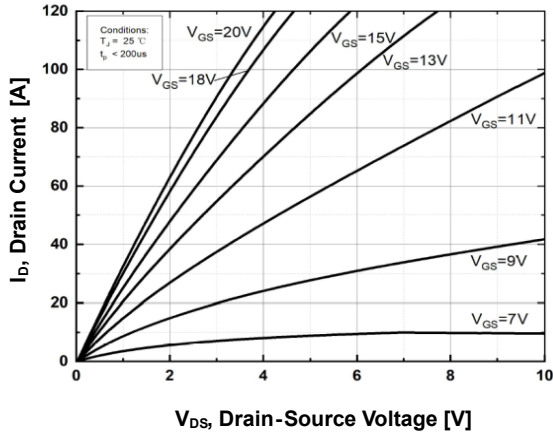
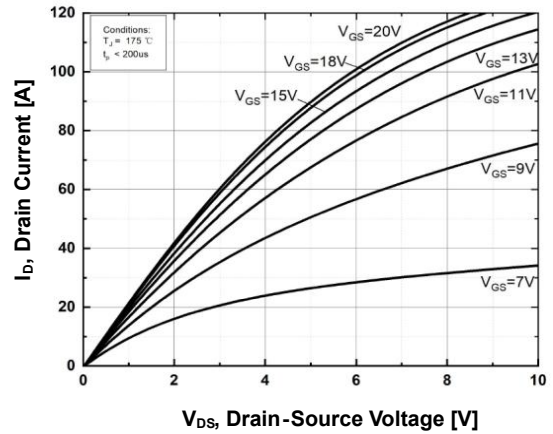
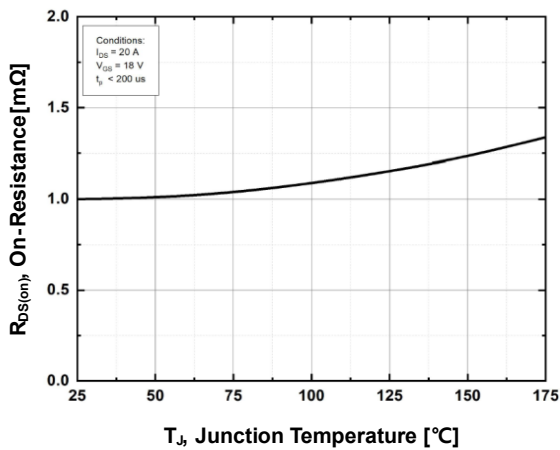
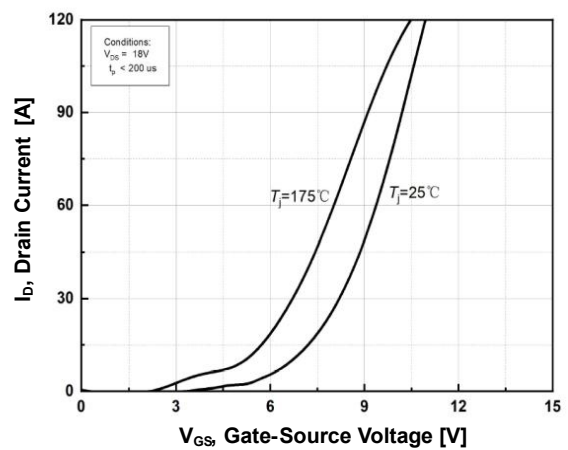
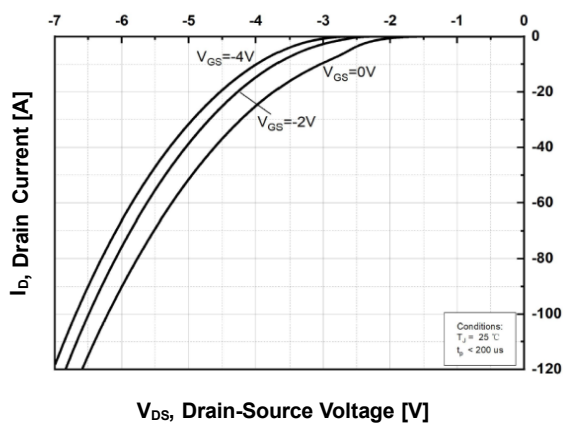
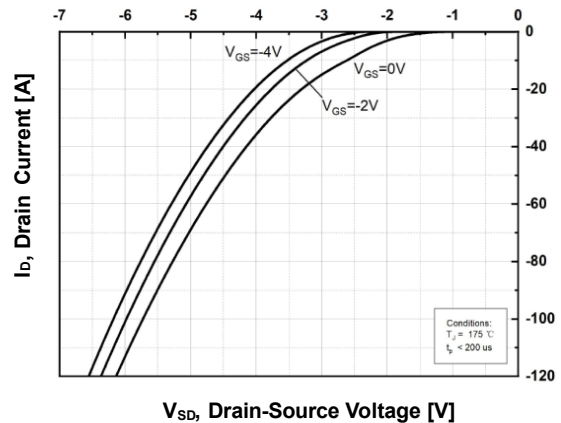
(T<sub>c</sub> = 25°C unless otherwise specified)

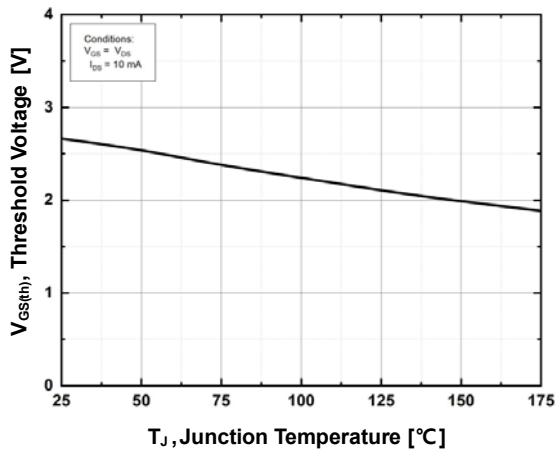
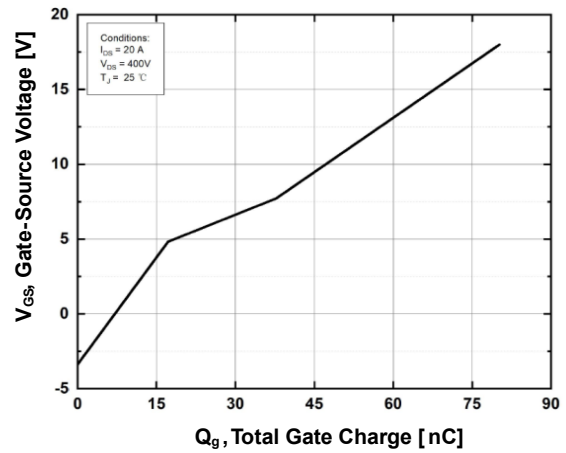
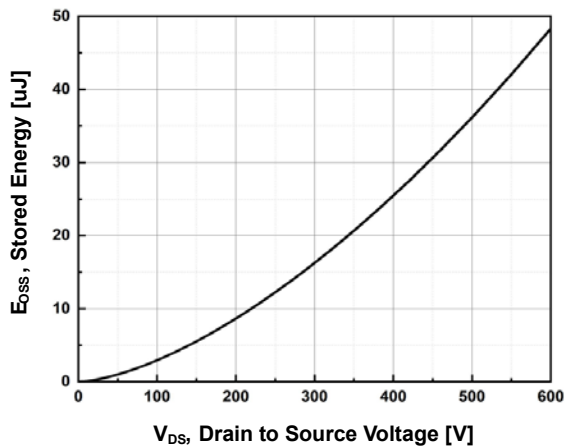
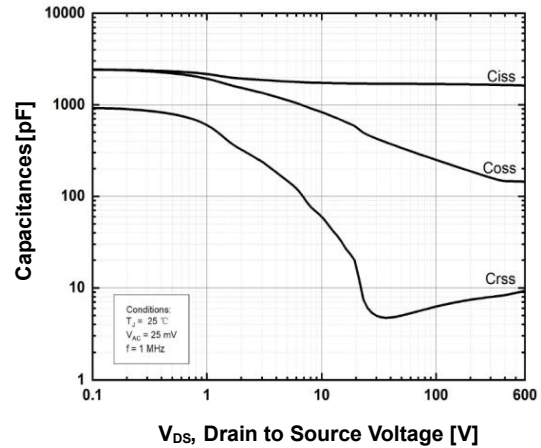
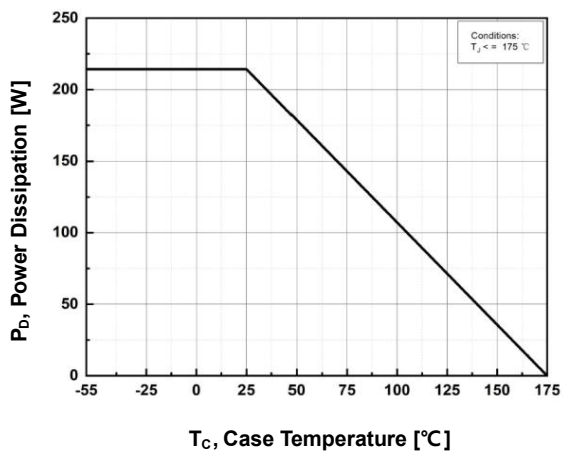
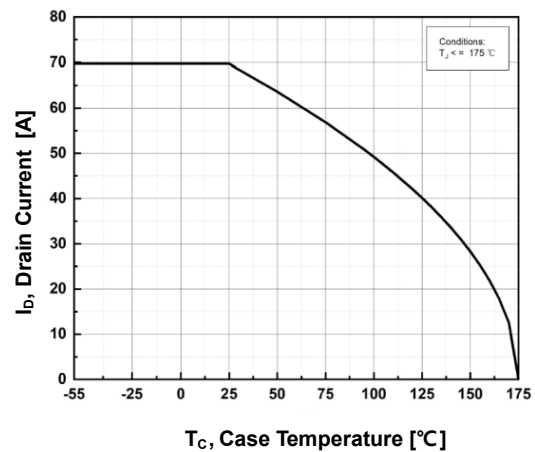
Parameter	Symbol	Ratings	Unit
Drain-Source Voltage $V_{GS}=0V$ $I_D=100\mu A$	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	-10/+25	V
Recommended Operation Value	$V_{GS(op)}$	-4/+18	V
Drain Current-Continuous @ T <sub>c</sub> =25°C @ T <sub>c</sub> =100°C	$I_D$	70 50	A
Pulse Drain Current Pulse width t <sub>p</sub> limited by T <sub>jmax</sub>	$I_{DM}$	120	A
Power Dissipation	$P_D$	217	W
Storage Temperature Range	T <sub>STG</sub>	-55 to +175	°C
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +175	°C
Soldering Temperature	T <sub>L</sub>	260	°C

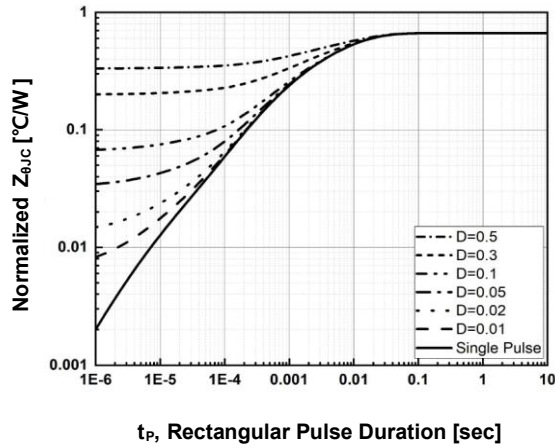
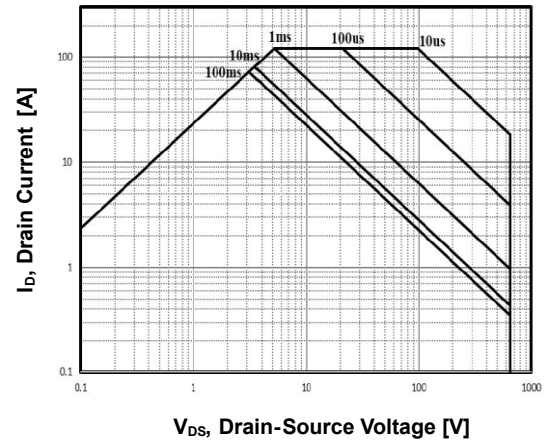
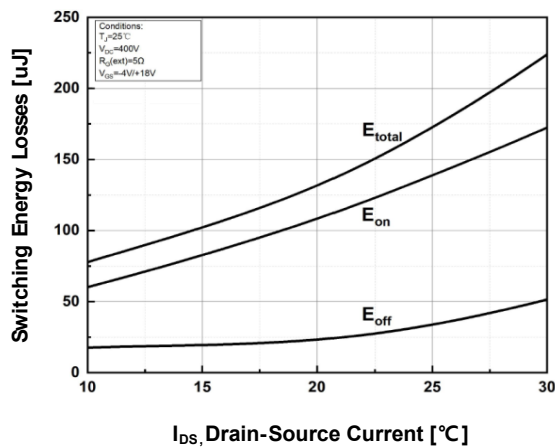
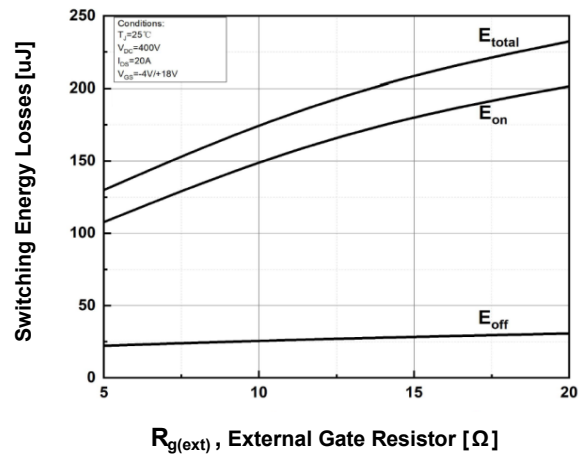
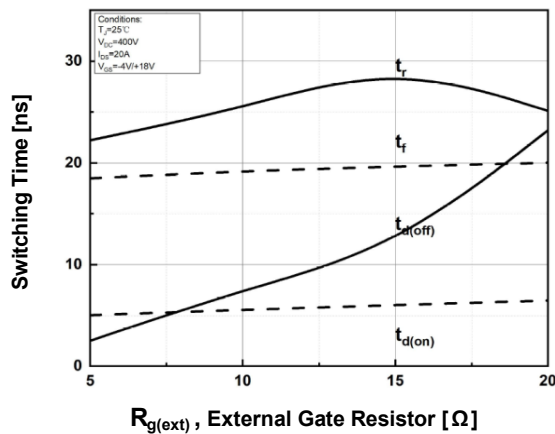
Symbol	Min	Max
A	4.83	5.21
A1	2.29	2.55
A2	1.50	2.49
b	1.12	1.33
b1	1.12	1.28
b2	1.91	2.39
b3	1.91	2.34
b4	2.87	3.22
b5	2.87	3.18
c	0.55	0.69
c1	0.55	0.65
D	20.80	21.10
D1	16.25	17.65
D2	0.51	1.35
E	15.75	16.13
E1	13.46	14.16
E2	4.32	5.49
e	5.44 BSC	
L	19.81	20.32
L1	4.10	4.40
ΦP	3.56	3.65
ΦP1	7.19 REF	
Q	5.39	6.20
S	6.04	6.30

**Electrical Characteristics @ T<sub>c</sub> =25°C (unless otherwise specified)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>OFF Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS}=0V, I_D=100\mu A$	650	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=650V$	-	1	50	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=18V, V_{DS}=0V$	-	-	250	nA
<b>ON Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=10mA$	-	2.8	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=20A$	-	35.5	53	m $\Omega$
		$V_{GS}=18V, I_D=20A, T_J=175^\circ C$	-	46	-	
Internal Gate Resistance	$R_{G(int.)}$	$f=1MHz, V_{AC}=25mV$	-	1.4	-	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=600V$ $V_{GS}=0V$ $f=1MHz$ $V_{AC}=25mV$	-	1600	-	pF
Output Capacitance	$C_{oss}$		-	15	-	
Reverse Transfer Capacitance	$C_{rss}$		-	10	-	
Turn-On Switching Energy	$E_{on}$	$V_{DS}=400V, V_{GS}=-4/+18V$ $I_D=40A, R_{G(ext)}=5\Omega$ $L=200\mu H$	-	110	-	$\mu J$
Turn-Off Switching Energy	$E_{off}$		-	25	-	
Total Switching Energy	$E_{tot}$		-	135	-	
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=400V$ $V_{GS}=-4/+18V$ $I_D=40A$ $R_{G(ext)}=5\Omega$ $L=200\mu H$	-	4	-	ns
Rise Time	$t_r$		-	21	-	
Turn-Off Delay Time	$t_{d(off)}$		-	20	-	
Fall Time	$t_f$		-	6	-	
Total Gate Charge	$Q_g$	$V_{DS}=400V$ $V_{GS}=-4/+18V$ $I_D=20A$	-	81	-	nC
Gate to Source Charge	$Q_{gs}$		-	20	-	
Gate to Drain Charge	$Q_{gd}$		-	22	-	
<b>Body Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=-4V, I_{SD}=10A$	-	4.3	-	V
Continuous Diode Forward Current	$I_S$	$V_{GS}=-4V, T_C=25^\circ C$	-	43	-	A
Reverse Recovery Time	$T_{rr}$	$V_{GS}=-4V$ $I_S=20A, V_R=400V$ $di/dt=2400A/\mu s$	-	20	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	100	-	nC
Reverse Recovery Charge	$I_{rrm}$		-	11	-	A
<b>Thermal Resistance</b>						
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		-	0.69	-	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$		-	40	-	

**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.  $V_{SD}$ - $I_{DS}$  Characteristics,  $T_J = 25^\circ\text{C}$** 

**Fig 6.  $V_{SD}$ - $I_{DS}$  Characteristics,  $T_J = 175^\circ\text{C}$** 


**Typical Performance**
**Fig 7. Threshold Voltage vs. Temperature**

**Fig 8. Gate Charge Characteristics**

**Fig 9. Stored Energy in Output Capacitance**

**Fig 10. Capacitance Characteristics**

**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. CIS Energy vs. Drain Current**

**Fig 16. CIS Energy vs. R<sub>g(ext)</sub>**

**Fig 17. Switching Times vs. R<sub>g(ext)</sub>**


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