

## Silicon Carbide Enhancement Mode MOSFET

### Features

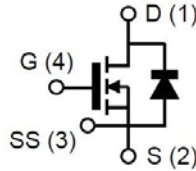
- Low Capacitance With High Speed Switching Speed
- High frequency operation with low Capacitance
- Simple to drive with -4V/+18V gate
- Low Reverse Recovery (Qrr)
- Halogen Free and ROHS Compliant

### Benefits

- Superior robustness and system reliability
- Simple to drive and easy to parallel
- Lower system cost of ownership
- Improved thermal capabilities and lower switching losses
- Faster and more efficient switching

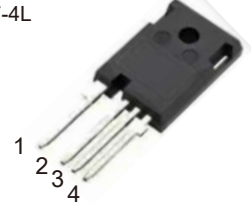
### Applications

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

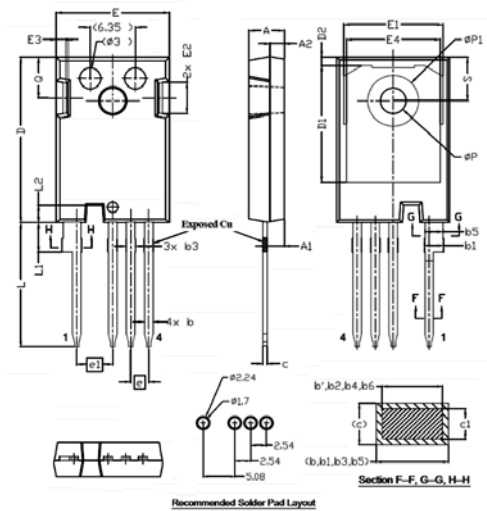


$V_{DSS}$	1200V
$I_D(@25^\circ\text{C})$	110A
$R_{DS(ON)}$ typ.	20m $\Omega$

TO-247-4L



Package Dimensions



### 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/+25	V
Recommended Operation Value	$V_{GS(op)}$	-4/+18	V
Drain Current-Continuous	$I_D$	110 80	A
		T <sub>c</sub> =25°C T <sub>c</sub> =100°C	
Pulse Drain Current	$I_{DM}$	180	A
		pulse width tp limited by T <sub>Jmax</sub>	
Total Power Dissipation	$P_D$	500	W
Storage Temperature Range	T <sub>STG</sub>	-55 to +175	°C
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +175	°C

Unit : mm

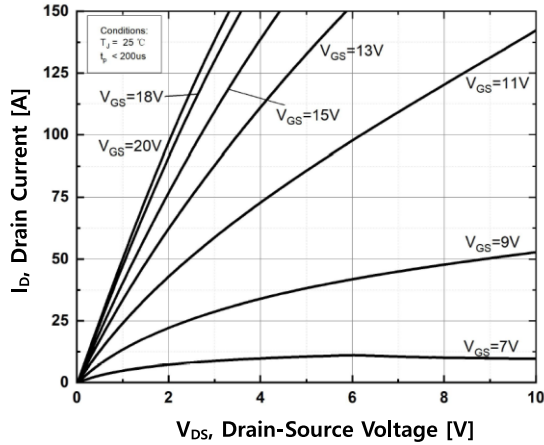
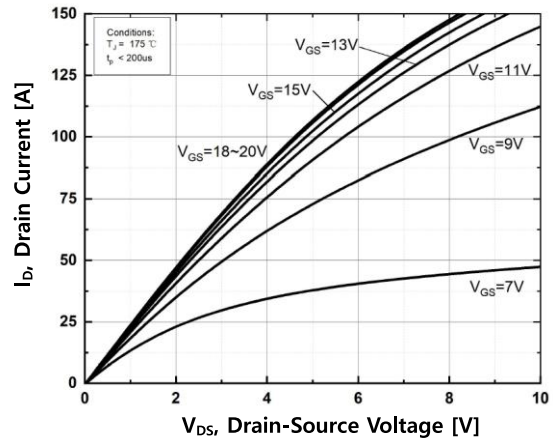
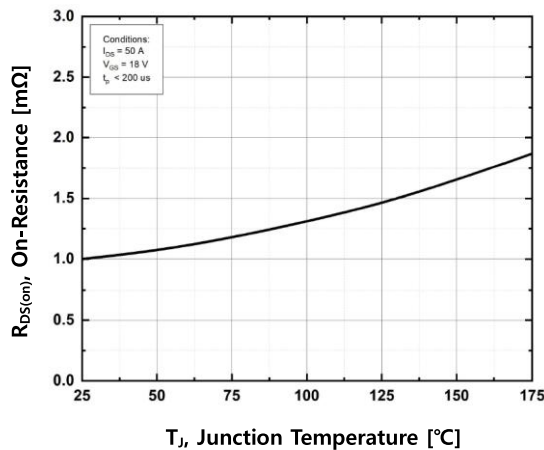
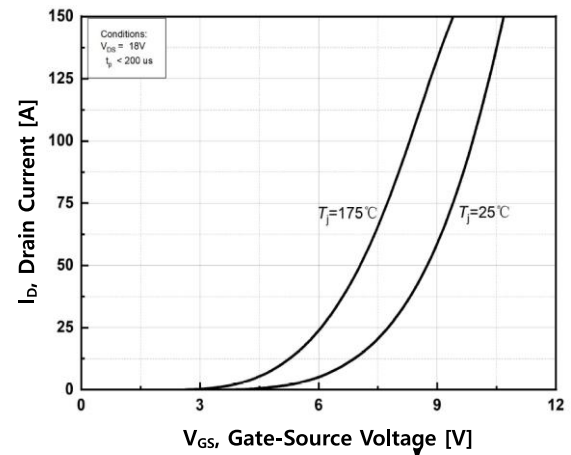
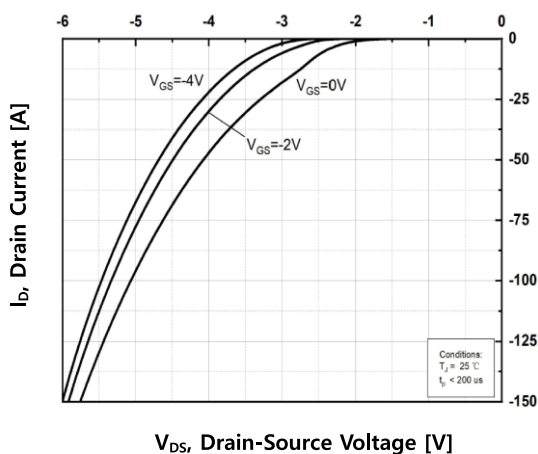
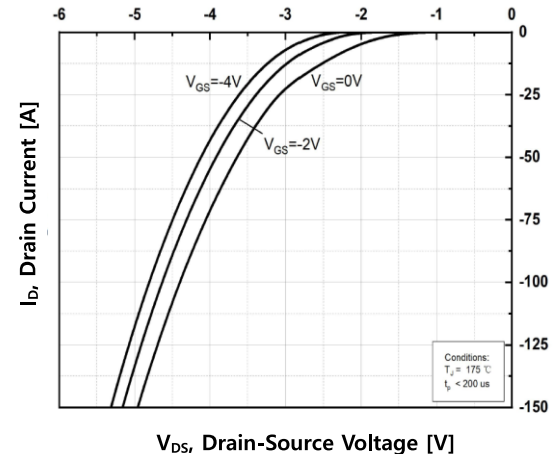
Symbol	Min	Max	Symbol	Min	Max
A	4.83	5.21	E	15.75	16.13
A1	2.29	2.54	E1	13.10	14.15
A2	1.91	2.16	E2	3.68	5.10
b'	1.07	1.28	E3	1.00	1.90
b	1.07	1.33	E4	12.38	13.43
b1	2.39	2.94	e	2.54 BSC	
b2	2.39	2.84	e1	5.08 BSC	
b3	1.07	1.60	L	17.31	17.82
b4	1.07	1.50	L1	3.97	4.37
b5	2.39	2.69	L2	2.35	2.65
b6	2.39	2.64	ΦP	3.51	3.51
c	0.55	0.68	ΦP1	7.19 REF	
c1	0.55	0.65	Q	5.49	6.00
D	23.30	23.60	S	6.04	6.30
D1	16.25	17.65	-	-	-
D2	0.95	1.25	-	-	-

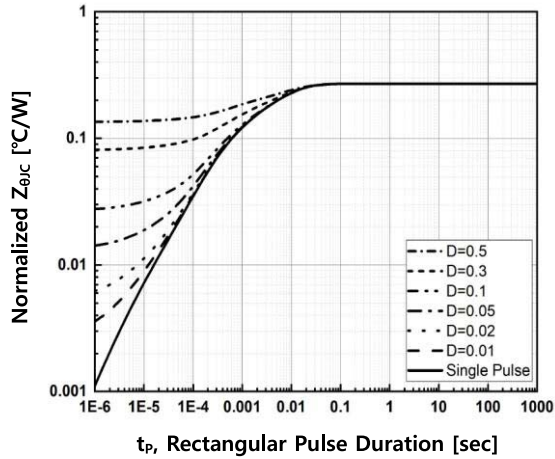
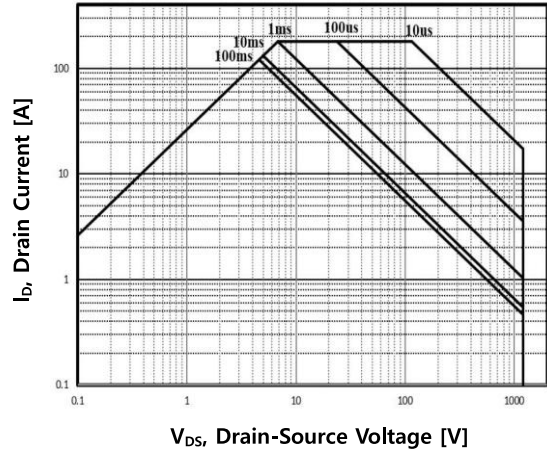
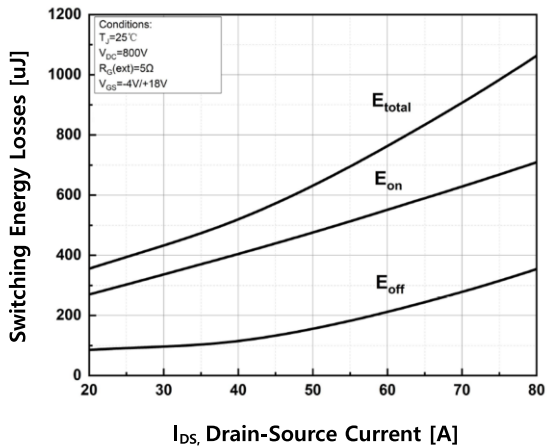
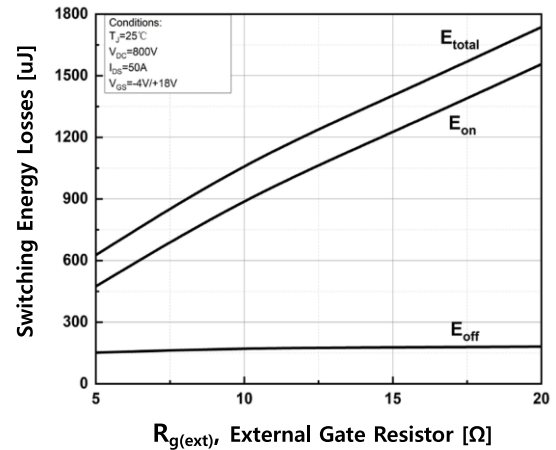
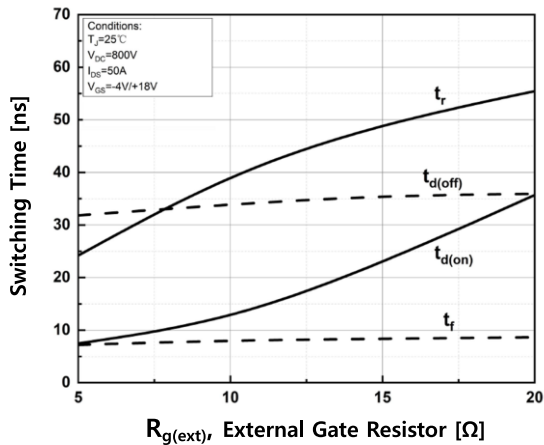
**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
<b>OFF Characteristics</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V I <sub>DS</sub> = 0.1mA	1200	-	-	V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0V V <sub>DS</sub> = 1200V	-	1	50	μA	
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 18V V <sub>DS</sub> = 0V	-	-	250	nA	
<b>ON Characteristics</b>							
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> · I <sub>DS</sub> = 15mA	-	3.0	-	V	
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 18V I <sub>DS</sub> = 50A	T <sub>VJ</sub> = 25°C	-	20	33	mΩ
			T <sub>VJ</sub> = 175°C	-	38	-	
Gate Resistance	R <sub>G(int)</sub>	f = 1MHz · V <sub>AC</sub> = 25mV	-	1.3	-	Ω	
<b>Dynamic Characteristics</b>							
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 1000V V <sub>GS</sub> = 0V V <sub>AC</sub> = 25mV f = 100kHz	-	4140	-	pF	
Output Capacitance	C <sub>oss</sub>		-	132	-		
Reverse Transfer Capacitance	C <sub>rss</sub>		-	8.6	-		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 800V V <sub>GS</sub> = -4V/+15V I <sub>D</sub> = 50A	-	165	-	nC	
Gate to Source Charge	Q <sub>gs</sub>		-	55	-		
Gate to Drain Charge	Q <sub>gd</sub>		-	60	-		
<b>Switching Characteristics</b>							
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 800V V <sub>GS</sub> = -4/+15V I <sub>D</sub> = 50A R <sub>G(ext)</sub> = 5Ω	-	10	-	ns	
Rise Time	t <sub>r</sub>		-	26	-		
Turn-Off Delay Time	t <sub>d(off)</sub>		-	35	-		
Fall Time	t <sub>f</sub>		-	9	-		
Turn-On Switching Energy	E <sub>on</sub>	V <sub>DD</sub> = 800V V <sub>GS</sub> = -4V/+15V I <sub>D</sub> = 50A R <sub>G(ext)</sub> = 5Ω	-	476	-	mJ	
Turn-Off Switching Energy	E <sub>off</sub>		-	155	-		
Total Switching Energy	E <sub>tot</sub>		-	631	-		
<b>Body Diode Characteristics , at T<sub>J</sub> = 25° C , unless otherwise specified</b>							
Continuous Diode Fwd Current	I <sub>SDC</sub>	V <sub>GS</sub> = -4V	-	100	-	A	
Maximum Source Current	I <sub>SM</sub>	V <sub>GS</sub> = -4V pulse width t <sub>p</sub> limited by T <sub>J</sub> max	-	180	-	A	
Drain-Source Reverse Voltage	V <sub>SD</sub>	I <sub>SD</sub> = 25A , V <sub>GS</sub> = -4V	-	4.2	-	V	
Reverse Recovery Charge	Q <sub>rr</sub>	V <sub>R</sub> = 800V I <sub>S</sub> = 50A V <sub>GS</sub> = -4V dif/dt = 4100 A/μs	-	296	-	nC	
Peak Forward Recovery Current	I <sub>rr</sub>		-	33	-	A	
Reverse Recovery Time	T <sub>rr</sub>		-	21	-	ns	
<b>Thermal Resistance</b>							
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>		-	0.3	-	°C/W	

**Notes:**

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle &gt; 2%.

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

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

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

**Fig. 4 Transfer Characteristics**

**Fig. 5  $V_{DS}-I_{DS}$  Characteristics,  $T_J=25^\circ\text{C}$** 

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


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

**Fig. 14 Safe Operating Area**

**Fig. 15 CIS Energy vs. Drain Current**

**Fig. 16 CIS Energy vs.  $R_{g(ext)}$** 

**Fig. 17 Switching Times vs.  $R_{g(ext)}$** 


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