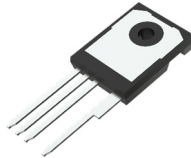


Product Summary

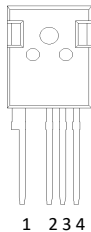
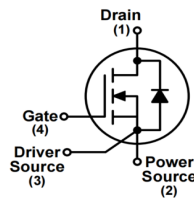
V_{DS}	$R_{DS(ON)_TYP}$	I_{D_MAX}
1200 V	31 mΩ @ $V_{GS} = 18V$	74 A

TO247-4L


Top View



Bottom


 PIN Configuration
(Top View)


Schematic Diagram

Features

- High switching speed with a low gate charge
- Fast intrinsic diode with low reverse recovery
- Robust Avalanche Capability
- 100% Avalanche Tested
- Pb-free, Halogen Free, and RoHS Compliant


Benefits

- System efficiency improvement
- Higher frequency applicability
- Increased power density
- Reduced cooling effort

Applications

- Solar inverters
- EV charging station
- UPS
- Industrial power supply

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
SCMP120R31AY4	TO247-4L	P120R31A	Tube	30

Maximum Ratings (@ $T_C = 25^\circ\text{C}$, unless otherwise specified.)

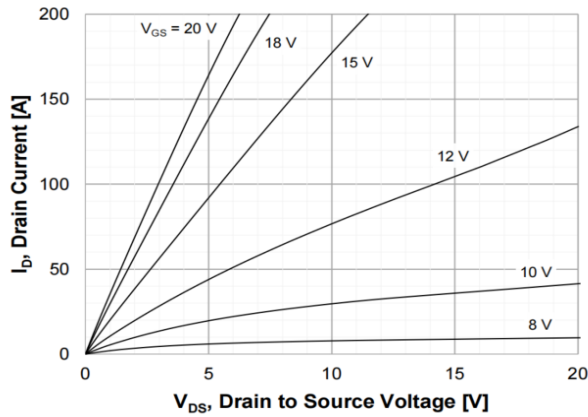
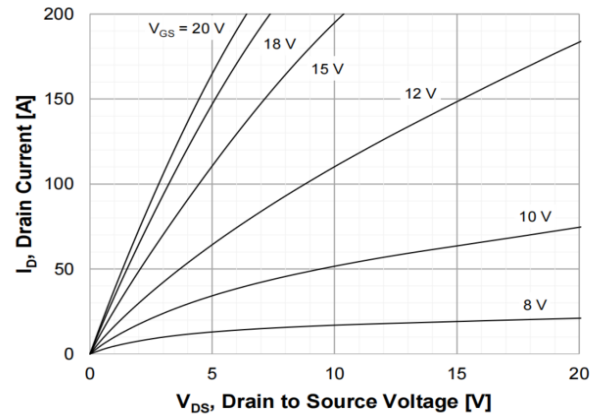
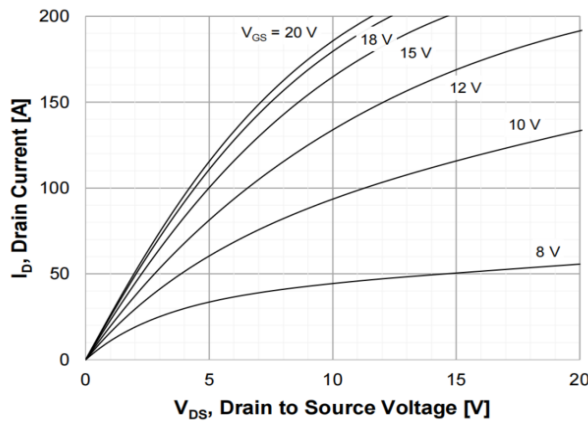
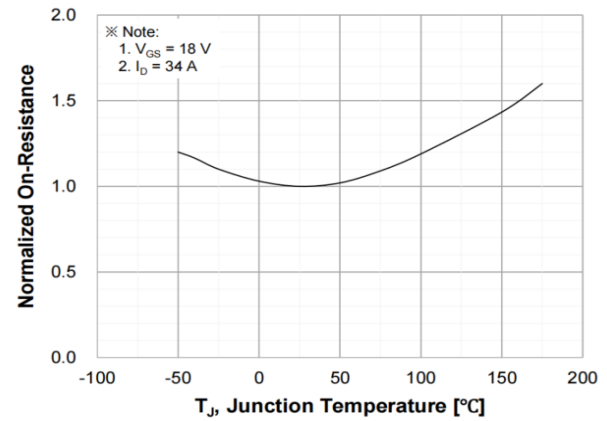
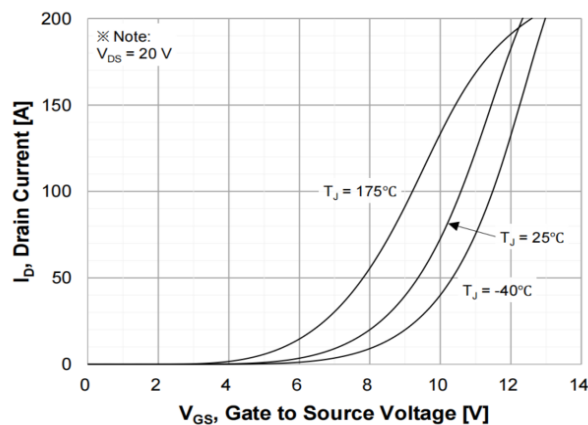
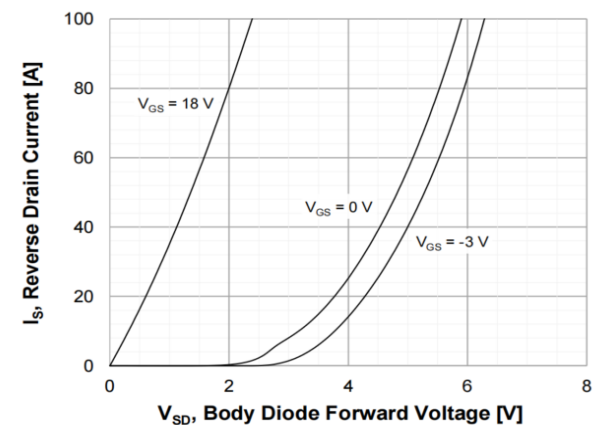
Parameter		Symbol	Value	Unit
Drain - Source Voltage		V_{DSmax}	1200	V
Gate - Source Voltage (DC)		V_{GS}	-10/+22	V
Gate - Source Voltage		V_{GSop}	-5/+18	V
Continuous Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	I_D	74	A
	Continuous ($T_C = 100^\circ\text{C}$)		52	A
Pulsed Drain Current		I_{DM}	185	A
Power Dissipation	($T_C = 25^\circ\text{C}$)	P_D	319	W
	Derate Above 25°C		2.1	W/°C
Junction & Storage Temperature Range		T_J, T_{STG}	-55 ~ +175	°C
Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds		T_L	260	°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	-	40	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	0.47	°C/W

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 1.0mA	1200	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 1200V, V _{GS} = 0V	-	1.0	100	μA
		V _{DS} = 1200V, V _{GS} = 0V, T _J =175°C	-	10.0	-	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = +22V, V _{DS} = 0V	-	-	+100	nA
		V _{GS} = -10V, V _{DS} = 0V	-	-	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 14mA (tested after V _{GS} = 22 V, 1 ms pulse)	2.0	3.2	4.5	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 18V, I _D = 34A	-	31	43.4	mΩ
		V _{GS} = 18V, I _D = 34A, T _J =175°C	-	49.6	-	mΩ
		V _{GS} = 15V, I _D = 34A	-	41	-	mΩ
Forward Transconductance	g _{fs}	V _{GS} = 20V, I _D = 34A	-	23.9	-	S
Diodes Forward Voltage	V _{SD}	V _{GS} = -3V, I _{SD} = 34A	-	4.1	-	V
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} = 800V, V _{GS} = 0V, f = 250KHz	-	2117	-	pF
Output Capacitance	C _{oss}		-	124	-	pF
Reverse Transfer Capacitance	C _{rss}		-	4.0	-	pF
Stored Energy in Output Capacitance	E _{oss}	V _{DS} = 0 V to 800 V, V _{GS} = 0 V	-	53	-	μJ
Internal Gate Resistance	R _G	f = 1MHz, V _{AC} =30mV	-	2.9	-	Ω
Switching Characteristics						
Turn-On Switching Loss	E _{on}	V _{DS} =800V, V _{GS} =-3/18V, I _D = 34A, R _G =4.7Ω	-	212	-	μJ
Turn-Off Switching Loss	E _{off}		-	95	-	
Total Switching Loss	E _{tot}		-	307	-	
Turn-On DelayTime	t _{d(on)}	V _{DS} =800V, V _{GS} =-3/18V, I _D = 34A, R _{G(ext)} =4.7Ω	-	21	-	ns
Rise Time	t _r		-	15	-	ns
Turn-Off DelayTime	t _{d(off)}		-	40	-	ns
Fall Time	t _f		-	7.0	-	ns
Gate Charge Characteristics						
Total Gate Charge	Q _{g(tot)}	V _{DS} =800V, V _{GS} =-3/18V, I _D = 34A	-	75	-	nC
Gate-Source Charge	Q _{gs}		-	24	-	nC
Gate-Drain Charge	Q _{gd}		-	13	-	nC
Drain-Source Diode Characteristics						
Reverse Recovery Time	t _{rr}	V _R = 800V, I _{SD} = 34 A, di/dt=3000A/μs ,Includes Q _{oss}	-	16	-	ns
Reverse Recovery Charge	Q _{rr}		-	275	-	nC
Peak Reverse Recovery Current	I _{rrm}		-	28	-	A
Continuous Diode Forward Current	I _S	V _{GS} = -3.0 V	-	-	74	A
Pulsed Diode Forward Current	I _{SM}	V _{GS} = -3.0 V	-	-	185	A

Typical Electrical and Thermal Characteristics
Figure 1. On-Region Characteristics $T_J = -40^\circ\text{C}$

Figure 2. On-Region Characteristics $T_J = 25^\circ\text{C}$

Figure 3. On-Region Characteristics $T_J = 175^\circ\text{C}$

Figure 4. Normalized On-Resistance Characteristics vs. Temperature

Figure 5. Transfer Characteristics

Figure 6. Diode Forward Voltage Characteristics vs. Source-Drain Current $T_J = -40^\circ\text{C}$


Typical Electrical and Thermal Characteristics

Figure 7. Diode Forward Voltage Characteristics vs. Source-Drain Current $T_J = 25^\circ\text{C}$

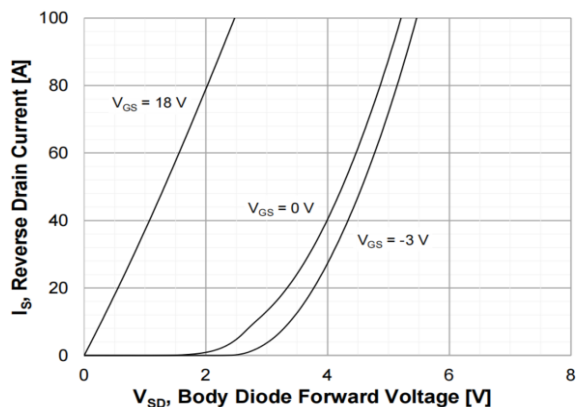


Figure 8. Diode Forward Voltage Characteristics vs. Source-Drain Current $T_J = 175^\circ\text{C}$

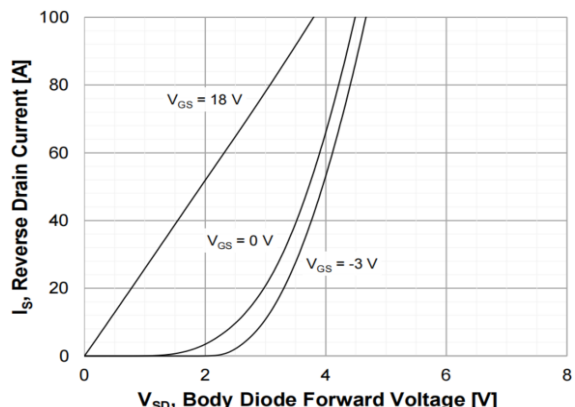


Figure 9. Threshold Voltage vs. Temperature

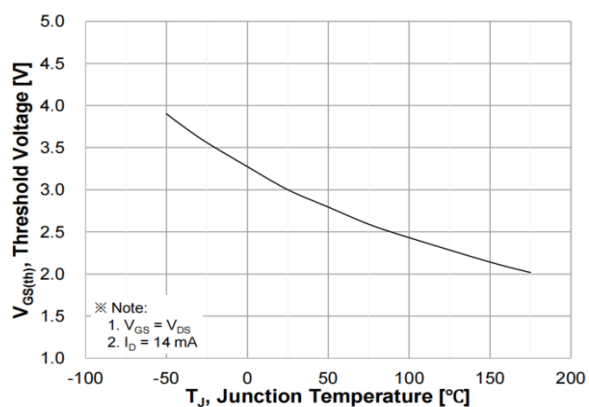


Figure 10. Gate Charge Characteristics

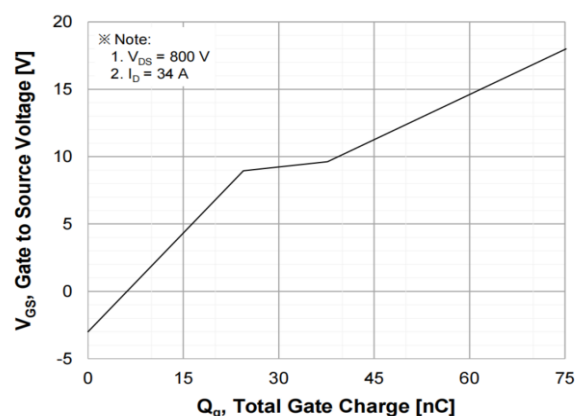


Figure 11. Stored Energy in Output Capacitance

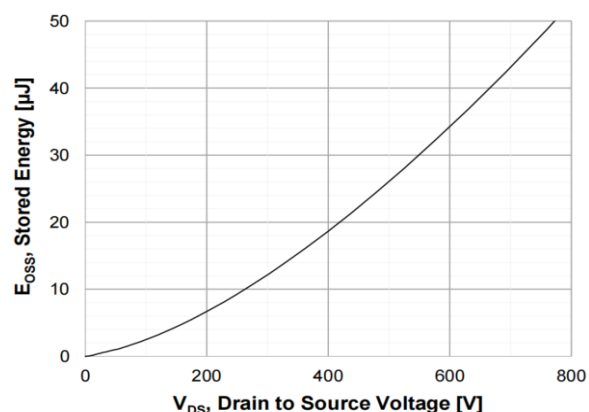
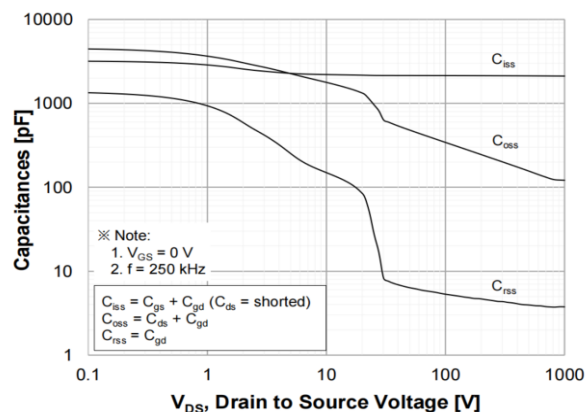
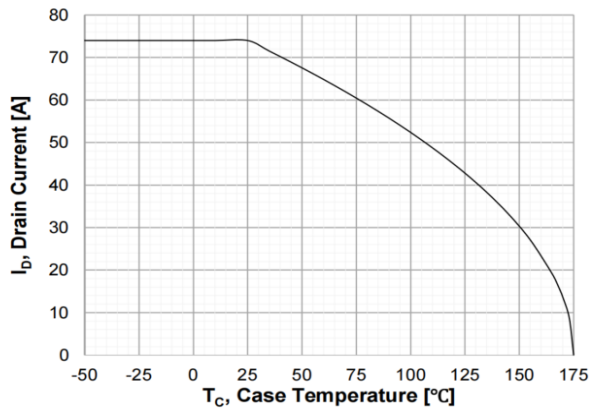
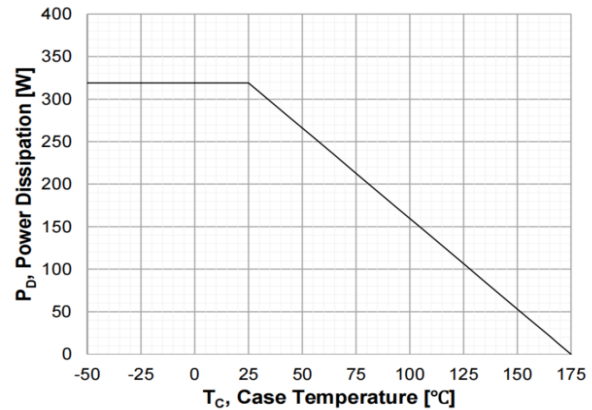
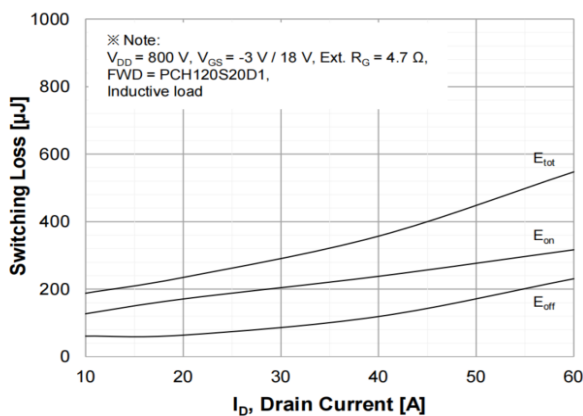
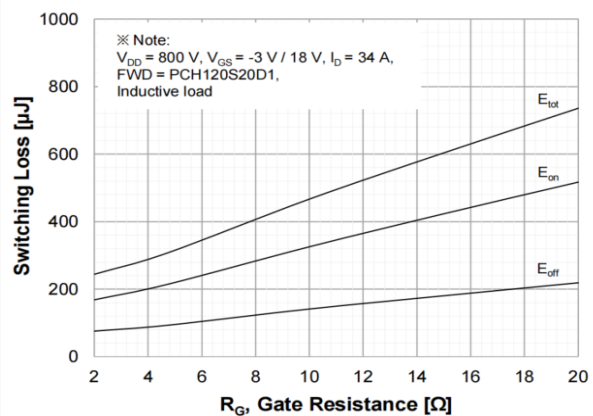
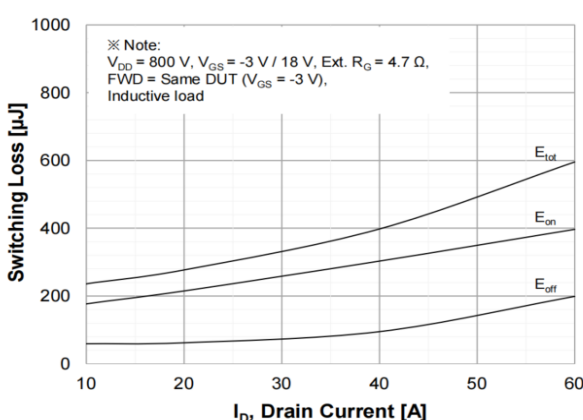
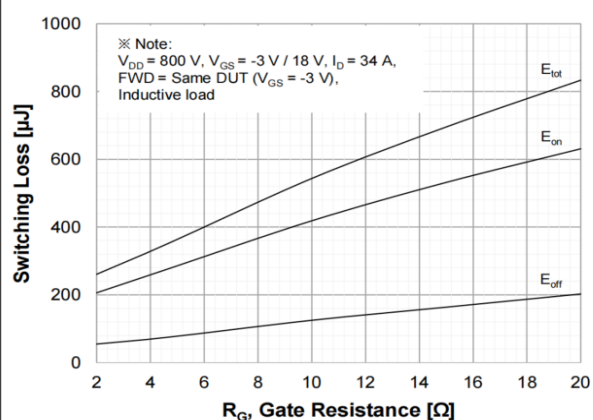
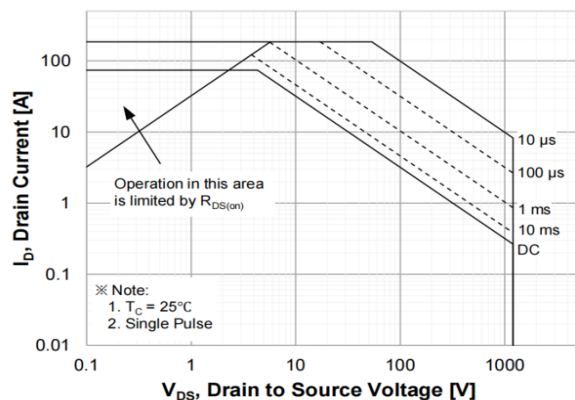
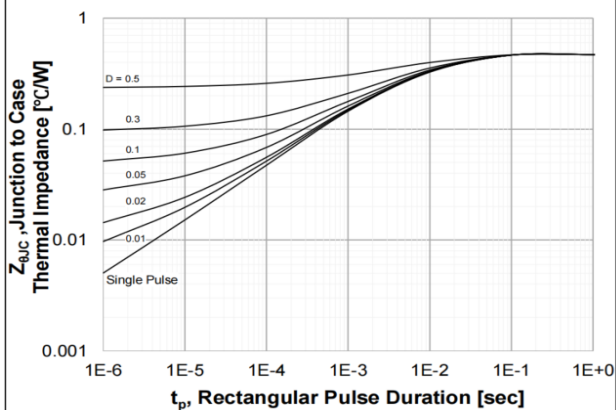


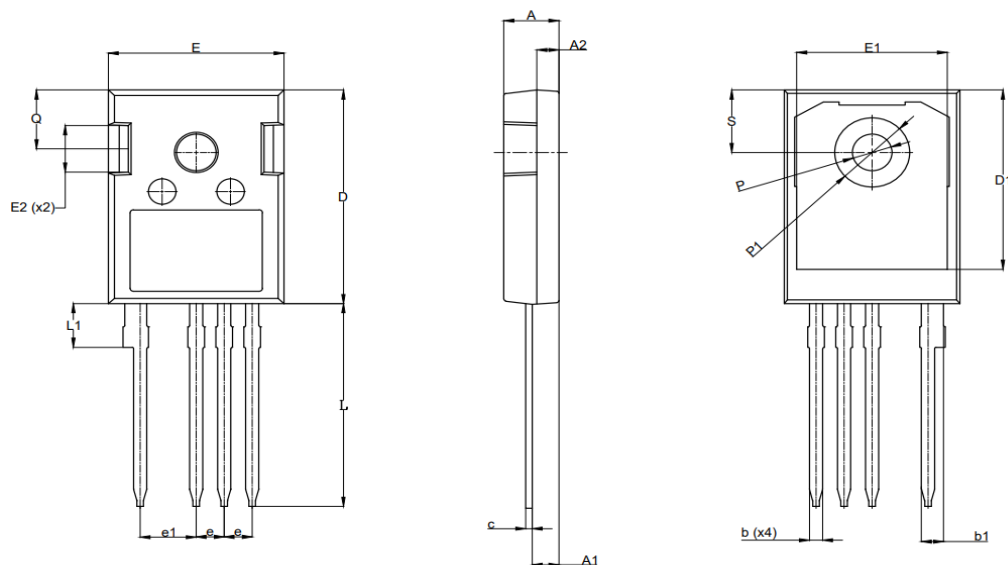
Figure 12. Capacitance Characteristics



Typical Electrical and Thermal Characteristics
Figure 13. Continuous Drain Current Derating vs. Case Temperature

Figure 14. Maximum Power Dissipation Derating vs. Case Temperature

Figure 15. Typ. Switching Losses vs. Drain Current

Figure 16. Typ. Switching Losses vs. Gate Resistance

Figure 17. Typ. Switching Losses vs. Drain Current

Figure 18. Typ. Switching Losses vs. Gate Resistance


Typical Electrical and Thermal Characteristics

Figure 19. Maximum Safe Operating Area

Figure 20. Transient Thermal Response Curve


TO247-4L Notch Package Outline


SYMBOL	Common		
	DIMENSIONS MILLIMETER		
	MIN.	NOM.	MAX.
A	4.80	5.00	5.20
A1	2.29	2.42	2.54
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b1	1.86	2.01	2.15
c	0.50	0.60	0.70
D	20.90	21.00	21.10
D1	17.43	17.63	17.83
E	15.75	15.94	16.13
E1	13.46	13.66	13.86
E2	4.32	4.58	4.83
e	2.54 BSC.		
e1	5.08 BSC.		
L	19.80	19.95	20.10
L1	-	-	4.30
P	3.56	3.61	3.66
P1	6.75	6.80	6.85
Q	5.38	5.79	6.20
S	6.15 BSC.		