

MOSFET-SiC Power Single N-Channel

Features

- Typ. $R_{DS(on)} = 58 \text{ m}\Omega$
- Ultra Low Gate Charge ($Q_{G(tot)} = 339 \text{ nC}$)
- Capacitance ($C_{OSS} = 128 \text{ pF}$)
- 100% UIL Tested

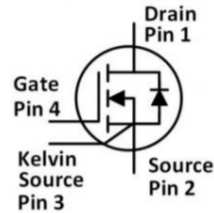
Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	ID_{Max}
3300V	58m Ω	225A

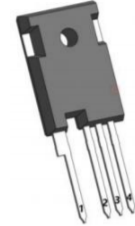
Typical Applications

- UPS
- EV Chargers
- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converter

N-CHANNEL MOSFET



TO-247-4L



Maximum Ratings ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions		Value	Unit
Drain-Source Voltage	V _{DSS}	T _J = -55...175°C		3300	V
Gate-Source Voltage	V _{GS} max	Absolute maximum values		-10/22	V
Continuous DC Drain Current for R _{th(j-c, max)}	I _{DDC}	V _{GS} = 15 V	T _C = 25°C	60	A
			T _C = 100°C	40	A
Pulsed Drain Current,Pulse width t _p limited by T _J max	I _{DM}	V _{GS} = 18 V, T _C = 25°C		225	A
Power Dissipation	P _{tot}	T _C = 25°C		428	W
Operating Junction and Storage Temperature Range	T _J , T _{stg}			-55 to +175	°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.

Thermal Resistance Maximum Ratings

Parameter	Symbol	Value(Typ.)	Unit
Junction-to-Case	$R_{\theta JC}$	0.35	$^\circ\text{C/W}$
Junction-to-Ambient	$R_{\theta JA}$	40.0	$^\circ\text{C/W}$

Static Electrical Characteristics

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 uA		3300	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 3300 V	T _J = 25 °C	-	-	100	μA
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 18V, I _D = 20 A	T _J = 25 °C	-	58	75	mΩ
			T _J = 175 °C	-	98	-	
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 20 mA	T _J = 25 °C	2.0	3.0	4.0	V
			T _J = 175 °C	-	2.2	-	
Gate-Source Leakage Current	I _{GSS}	V _{GS} = -10/+20 V, V _{DS} = 0V		-	150	-	nA
Input Capacitance	C _{ISS}	V _{GS} = 0 V, V _{DS} = 1000 V, f = 1.0 MHz, V _{AC} = 25 mV		-	7305	-	pF
Output Capacitance	C _{OSS}			-	128	-	
Reverse TransferCapacitance	C _{RSS}			-	12.5	-	

Dynamic Electrical Characteristics

Parameter	Symbol	Test Conditions		Typ	Unit
Turn-On Energy (Body Diode)	E _{ON}	V _{GS} = -5/18V, V _{DS} = 1700 V, I _D = 50 A, L=60uH	T _J = 25 °C	1234	uJ
Turn-On Energy (Body Diode)	E _{OFF}	V _{GS} = -5/18V, V _{DS} = 1700 V, I _D = 50 A, L=60uH	T _J = 25 °C	538	
Turn-On Delay Time	t _{d(on)}	V _{GS} = -5/18V, V _{DS} = 1700 V, I _D = 50 A, L=60uH, R _{G(ext)} = 3 Ω	T _J = 25 °C	76	ns
Rise Time	t _r	V _{GS} = -5/18V, V _{DS} = 1700 V, I _D = 50 A, L=60uH, R _{G(ext)} = 3 Ω	T _J = 25 °C	38	ns
Turn-Off Delay Time	t _{d(off)}	V _{GS} = -5/18V, V _{DS} = 1700 V, I _D = 50 A, L=60uH, R _{G(ext)} = 3 Ω	T _J = 25 °C	31	ns
Fall Time	t _f	V _{GS} = -5/18V, V _{DS} = 1700 V, I _D = 50 A, L=60uH, R _{G(ext)} = 3 Ω	T _J = 25 °C	17	ns
Total Gate Charge	Q _{G(tot)}	V _{GS} = -5/18V, V _{DS} = 1000 V, I _D = 40 A		339	nC
Gate-Source Charge	Q _{GS}			123	
Gate-Drain Charge	Q _{GD}			101	
Internal Gate Resistance	R _{G(int)}	f = 1 MHz, V _{AC} =25mV		1.5	Ω

Reverse Diode Characteristic

Parameter	Symbol	Test Conditions		Typ	Unit
Forward Voltage	V _{FSD}	V _{GS} = 0 V, I _F = 10 A	T _J = 25 °C	3.3	V
			T _J = 175 °C	3.1	
Continuous Diode Forward Current	I _S	V _{GS} = 0 V, T _c = 25 °C	T _J = 25 °C	55	A
Reverse Recovery Time	t _{RR}	V _{GS} = -5 V, I _F = 50 A, V _R = 1700 V, di/dt=500A/us, T _J = 175°C		178	ns
Reverse Recovery Charge	Q _{RR}			2838	nC
Peak Reverse Recovery Current	I _{RRM}			38	A

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.

Typical Performance

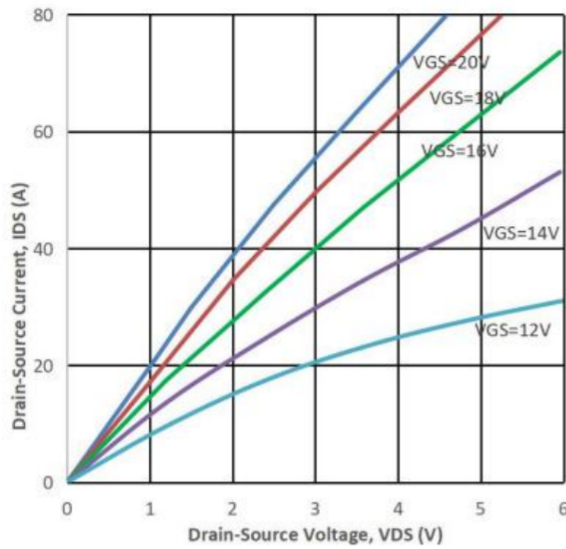


Figure 1. Output characteristics, $T_J = 25^\circ\text{C}$

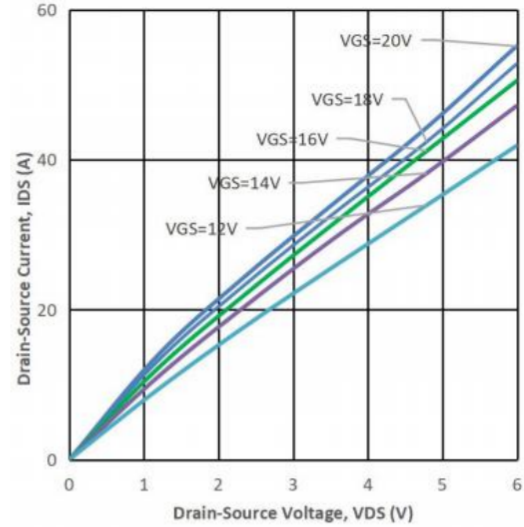


Figure 2. Output characteristics, $T_J = 175^\circ\text{C}$

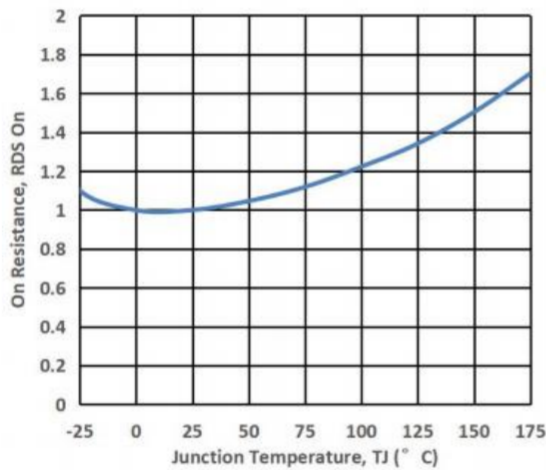


Figure 3. On-resistance vs. temperature for various gate voltage

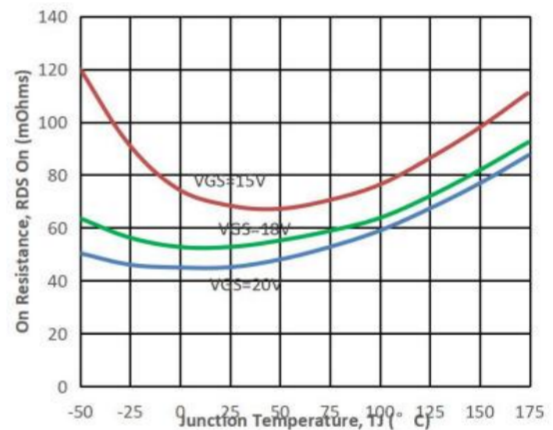


Figure 4. Transfer characteristic for various junction temperatures

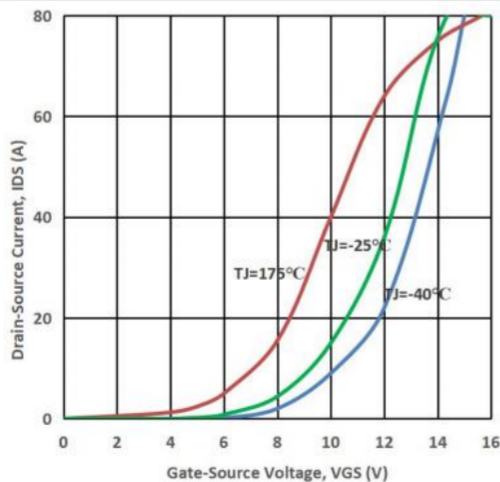


Figure 5. Transfer characteristic for various junction temperatures

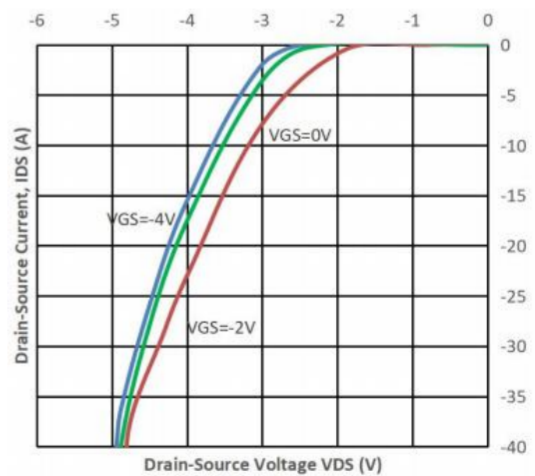


Figure 6. Body diode characteristic at $T_J = 25^\circ\text{C}$

Typical Performance

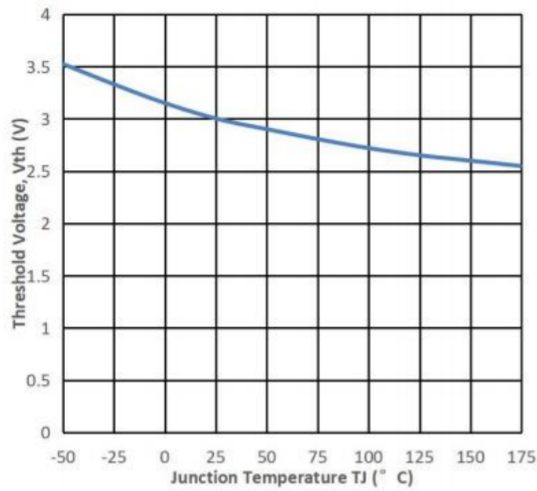


Figure 7. Threshold voltage vs. temperature

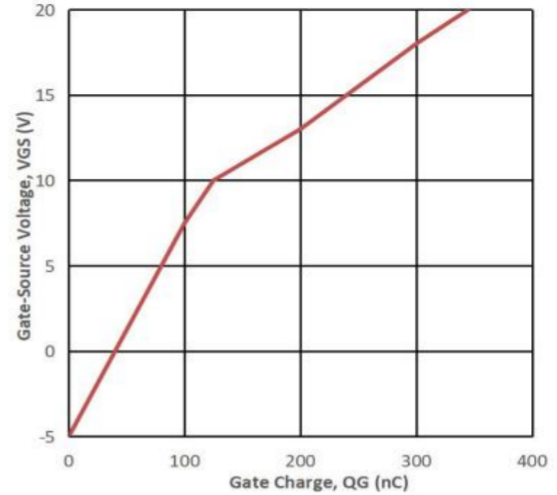


Figure 8. Gate charge characteristic

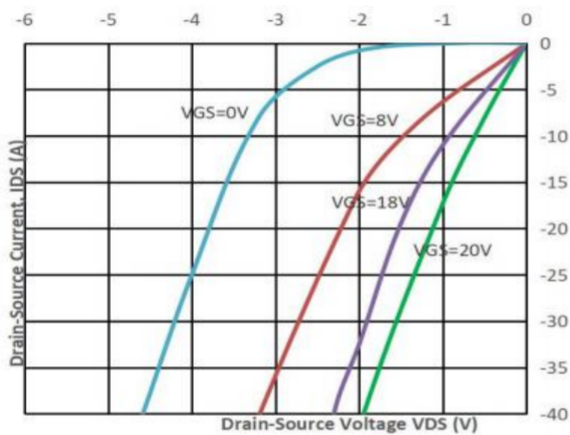


Figure 9. 3rd quadrant characteristic at 25°C

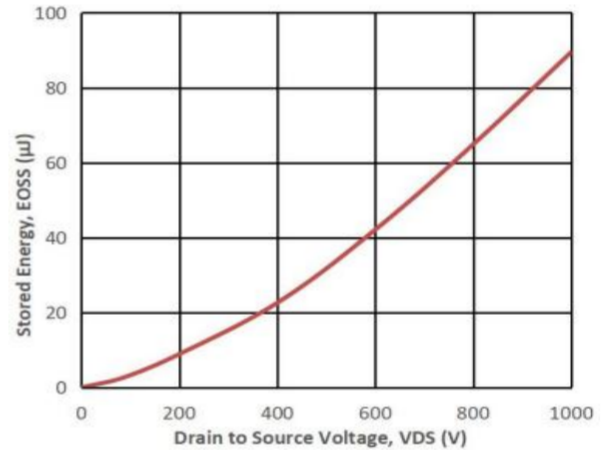


Figure 10. Output capacitor stored energy

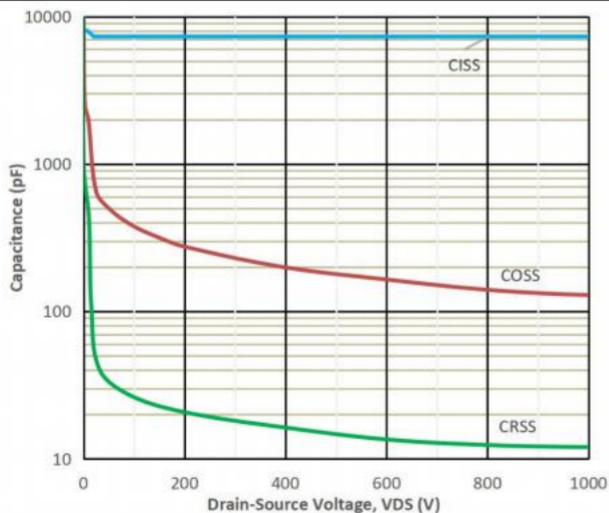


Figure 11. Capacitances vs. drain-source voltage

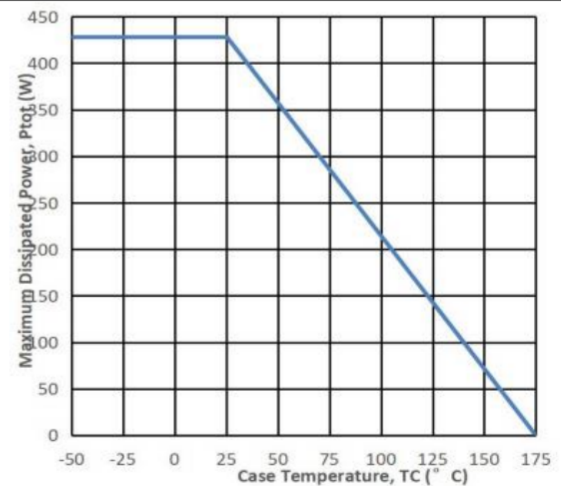


Figure 12. Maximum power dissipation derating vs. case temperature

Typical Performance

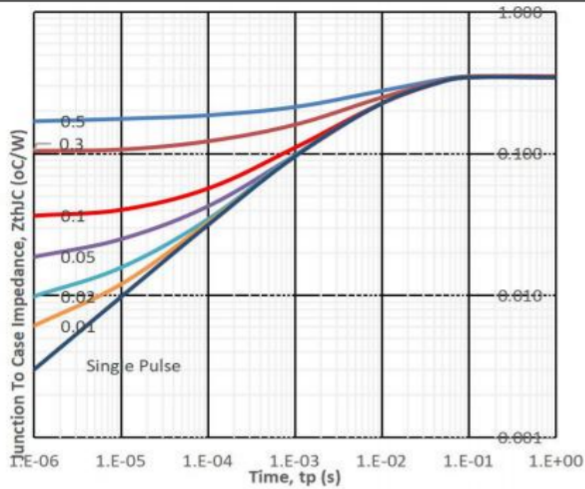


Figure 13. Transient thermal impedance (junction - case)

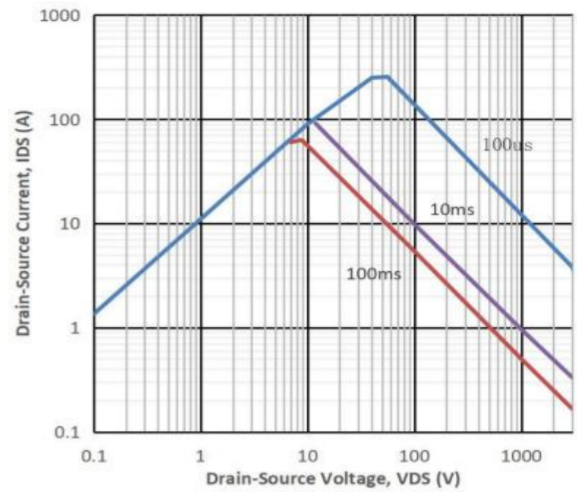


Figure 14. Safe operating area

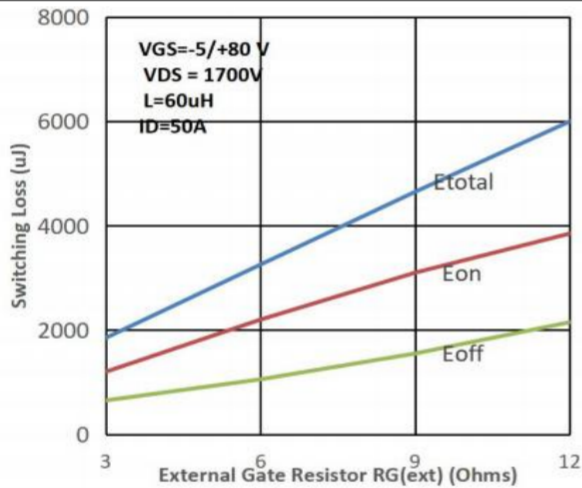


Figure 15. Clamped inductive switching energy vs. $R_{G(ext)}$

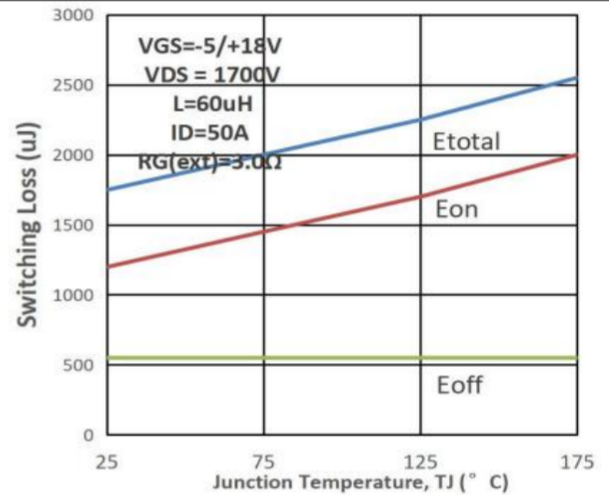


Figure 16. Clamped inductive switching energy vs. temperature

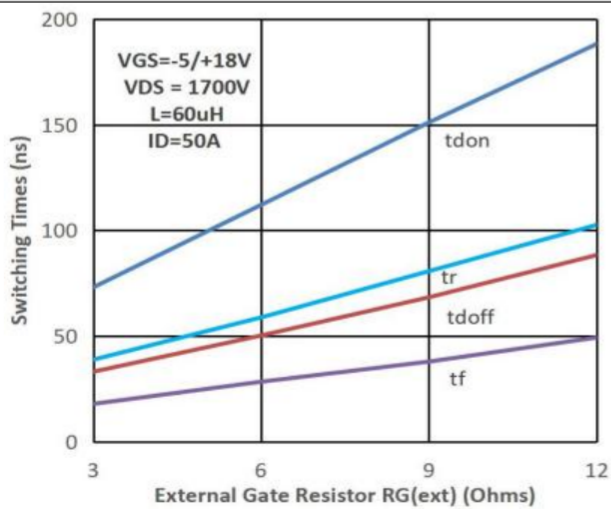


Figure 17. Switching times vs. $R_{G(ext)}$

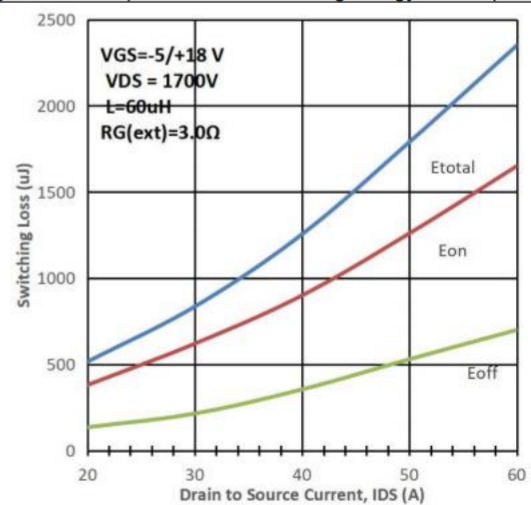
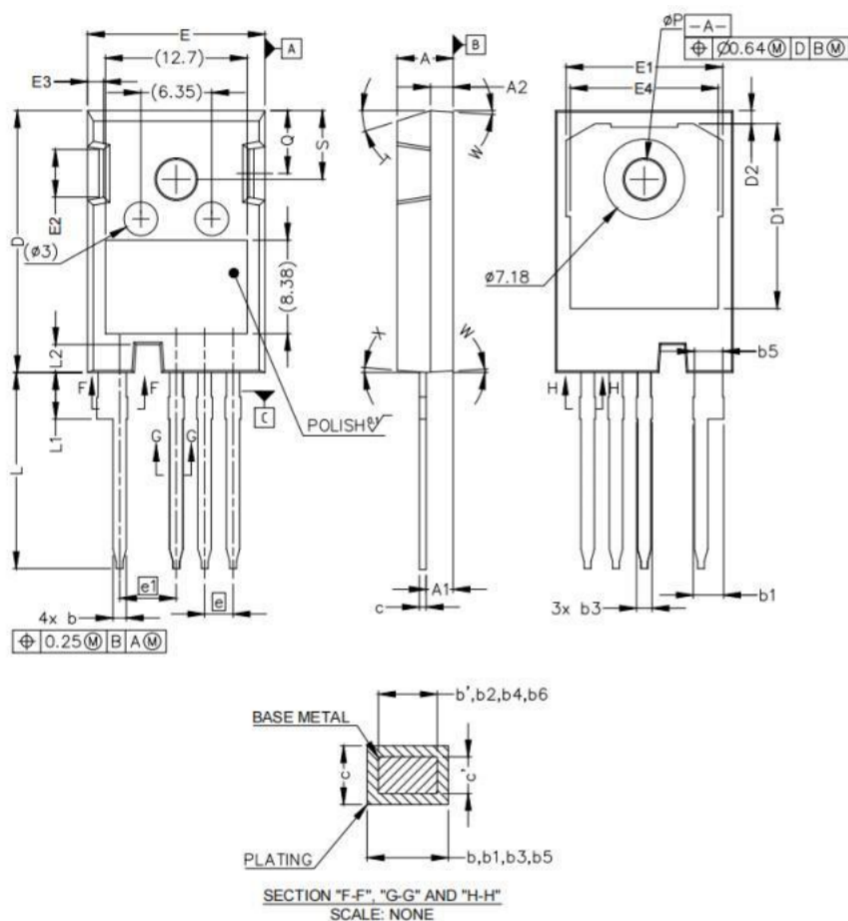


Figure 18. Switching energy vs. drain current

Package Marking And Ordering Information

Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
SC06N330TCL	SC06N330TCL	TO-247 Long Lead	Tube	N/A	N/A	30 Units

Package Dimensions: TO-247-4



SYMBOL	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
ØP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	