

QS120SCM80D2P 1200V N-Channel SiC Mosfet



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General Features

- Fast Switching with Low EMI/RFI
- Low Gate Charge Minimize Switching Loss
- Short Circuit Withstand Rated
- Low RDS(ON) Temperature Coefficient for Improve Efficiency

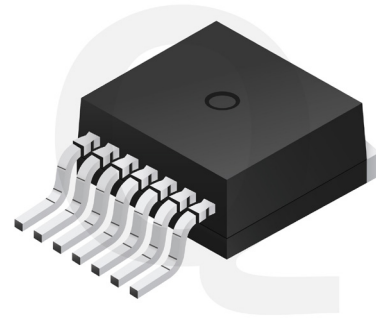
General Features

Parameter	Value	Unit
BVDSS	1200	V
RDS(ON), typ. (20V)	80	mΩ
VGS(TH), typ.	2.6	V
Eon	325	uJ
Eoff	219	uJ
ID (at TC=25°C)	40	A

Applications

- Asymmetrical Bridge
- Converter
- Inverter
- Single Switch Forward
- Flyback

General Features



Ordering Information

Part Number	Package	Marking
QS120SCM80D2P	TO-263-7L	Q

Absolute Maximum Ratings

TC=25°C unless otherwise specified

Symbol	Parameter	Value	Unit
VDSS	Drain-to-Source Voltage [1]	1200	V
VGSmax	Maximum Gate-to-Source Voltage	-10 ~ +25	
VGSop(DC)	Recommended operation Values of Gate to Source Voltage	-5.0 ~ +20	
VGSop(AC)	Recommended operation Values of Gate to Source Voltage (f > 1Hz)	-5.0 ~ +20	

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ID	Continuous Drain Current	40	A
	Continuous Drain Current at TC=100°C	29	
IDM	Pulsed Drain Current at VGS=10V [2]	101	
EAS	Single Pulse Avalanche Energy (VDD=100V, VGS=20V, RG=25Ω, L=1mH)	136	mJ
PD	Power Dissipation	250	W
	Derating Factor above 25°C	1.7	W/°C
TL	Soldering Temperature, Distance of 1.6mm from case for 10 seconds	300	°C
TJ & TSTG	Operating and Storage Temperature Range	-55 to 175	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
RθJC	Thermal Resistance, Junction-to-Case			0.60	°C/W
RθJA	Thermal Resistance, Junction-to-Ambient			55	

Electrical Characteristics OFF Characteristics

TJ=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BVDSS	Drain-to-Source Breakdown Voltage	1200			V	VGS = 0V, ID = 100uA
IDSS	Drain-to-Source Leakage Current			100	uA	VDS = 1200V, VGS = 0V
IGSS+	Gate-to-Source Leakage Current			100	nA	VGS = 20V, VDS = 0V
IGSS-	Gate-to-Source Leakage Current			-100	nA	VGS = -10V, VDS = 0V

ON Characteristics

TJ=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
RDS(ON)	Static Drain-to-Source On-Resistance [3]		80	100	mΩ	VGS = 20V, ID = 20A
			121			VGS = 20V, ID = 20A TJ=150°C
VGS(TH)	Gate Threshold Voltage	1.8	2.6	3.8	V	VDS = VGS, ID = 5.0mA

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Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Ciss	Input Capacitance		1001		pF	VGS = 0V, VDS = 800V, f = 1.0MHZ
Crss	Reverse Transfer Capacitance		7.2			
Coss	Output Capacitance		60			
Rg	Gate Series Resistance		5.6		Ω	f = 1.0MHZ
Qg	Total Gate Charge		60		nC	VDD = 600V, ID = 20A, VGS = -5/20V
Qgs	Gate-to-Source Charge		16			
Qgd	Gate-to-Drain (Miller) Charge		23			

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
td(on)	Turn-on Delay Time		11		ns	VDD = 800V ID = 20A VGS = -5/20V RG = 4.7Ω L = 500uH
trise	Rise Time		37			
td(off)	Turn-off Delay Time		24			
tfall	Fall Time		9.8			
EON	Turn-On Switching Energy		325		μJ	
EOFF	Turn Off Switching Energy		219			

Source-Drain Body Diode Characteristics

TJ=25°C unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
ISD	Continuous Source Current			40	A	Maximum Ratings
VSD	Diode Forward Voltage		2.6		V	IS = 0.5A, VGS = 0V
trr	Reverse Recovery Time		20		ns	VGS = 0V IF = 20A di/dt = 800A/μs
Qrr	Reverse Recovery Charge		39		nC	
Irrm	Peak Reverse Recovery Current		2.8		A	

[1] TJ=25°C to 175°C

[2] Repetitive rating, pulse width limited by maximum junction temperature [3] Pulse width ≤ 380μs; duty cycle ≤ 2%

Typical Characteristics

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

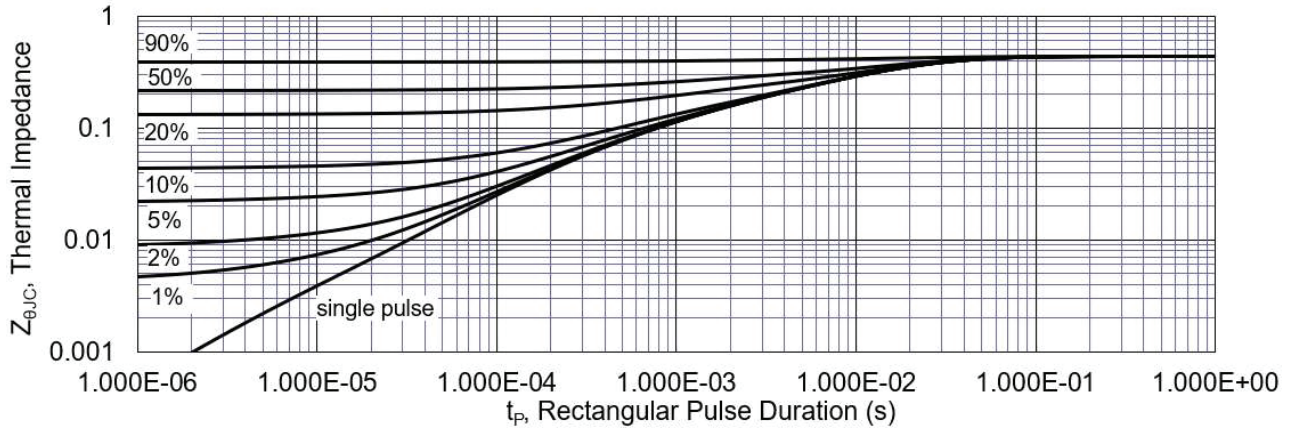


Figure 2.

Figure 2. Maximum Power Dissipation vs. Case Temperature

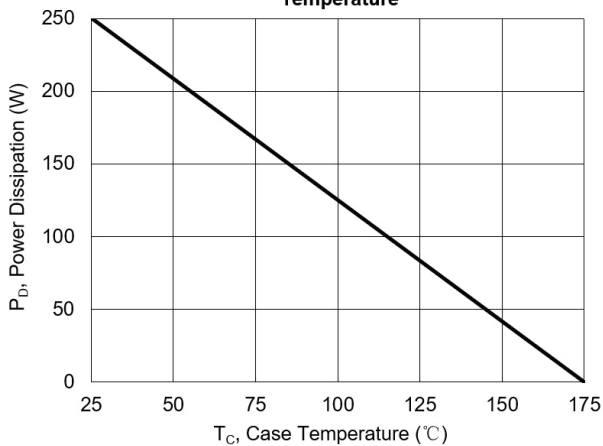


Figure 3.

Figure 3. Maximum Continuous Drain Current vs Case Temperature

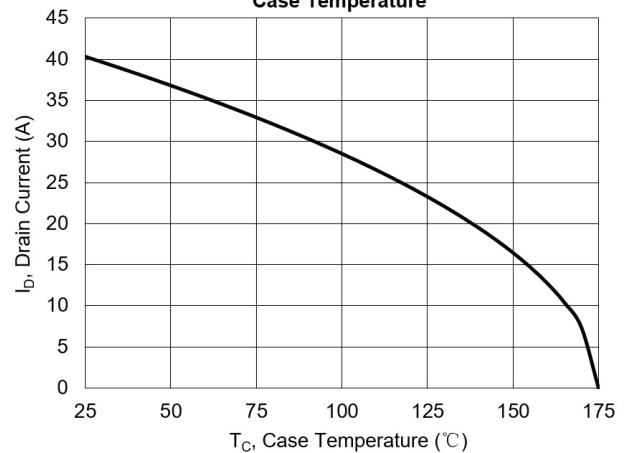


Figure 4.

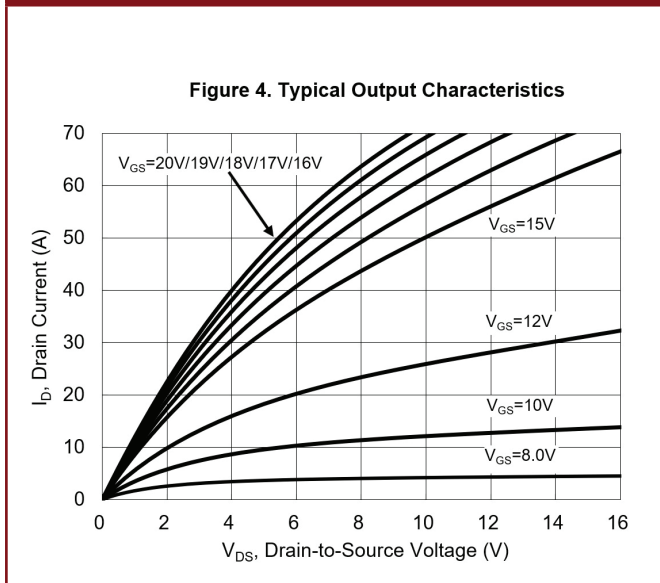


Figure 5.

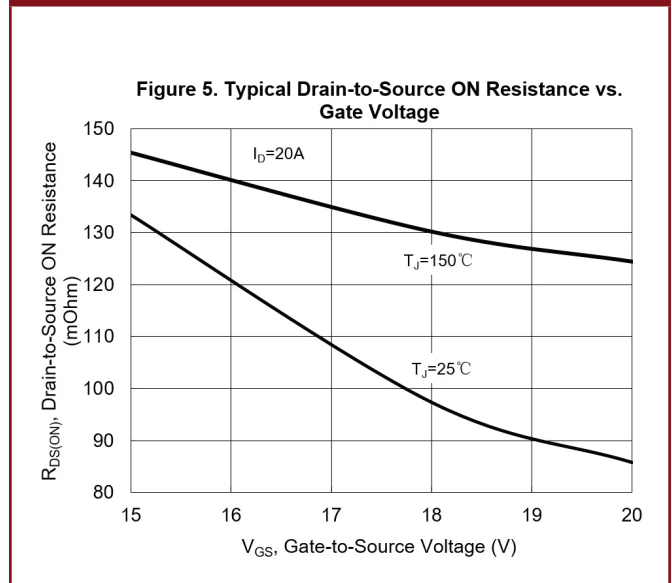
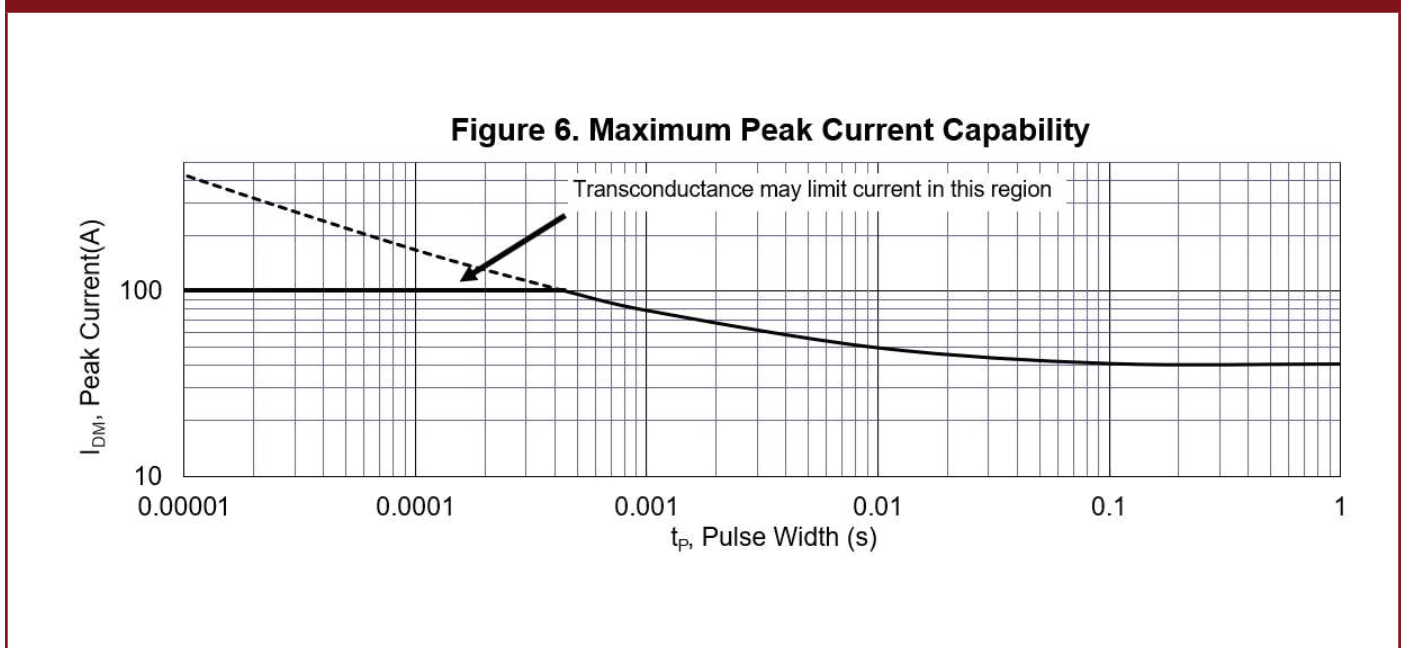


Figure 6.



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Figure 7.

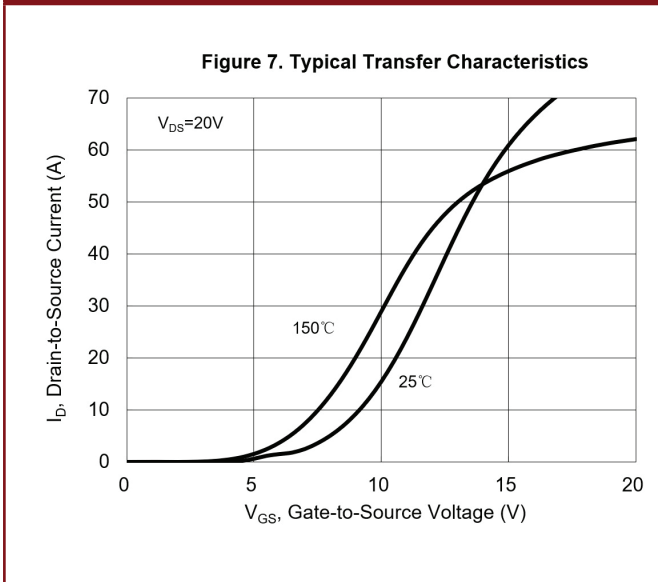


Figure 8.

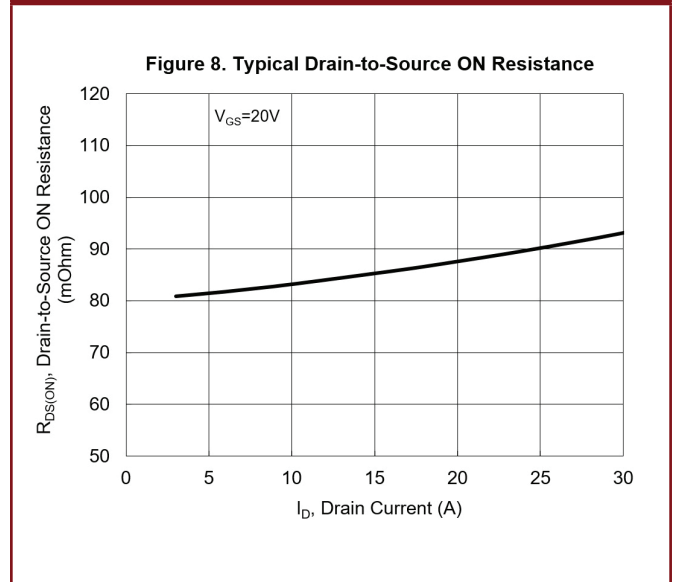


Figure 9.

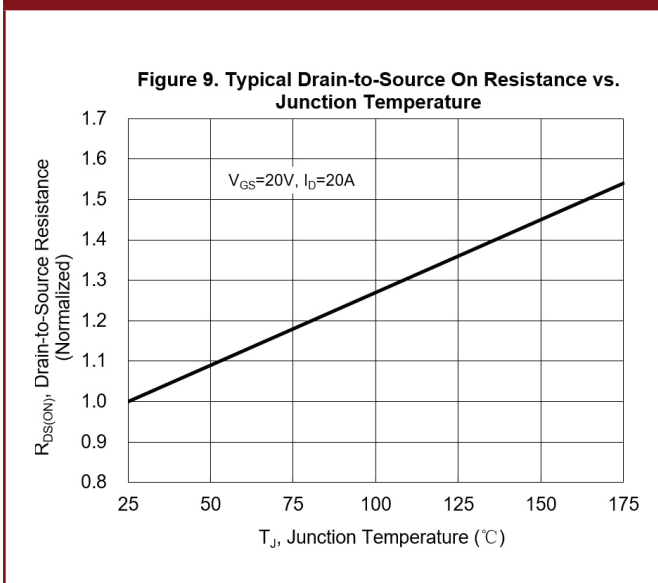
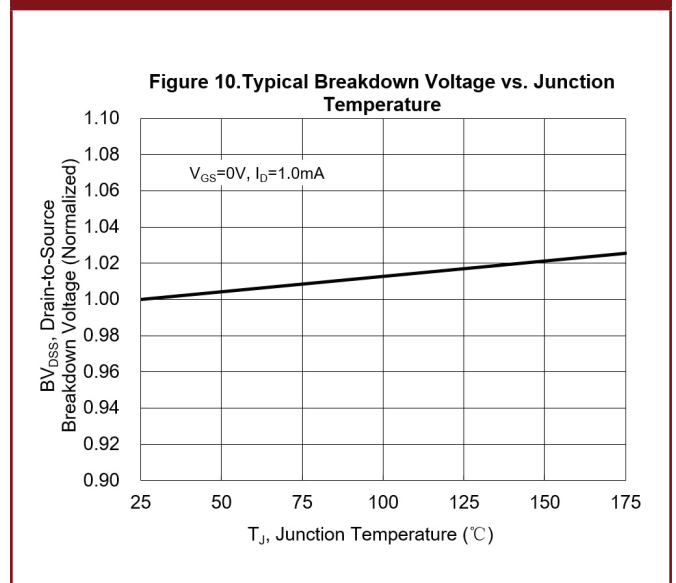


Figure 10.



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Figure 11.

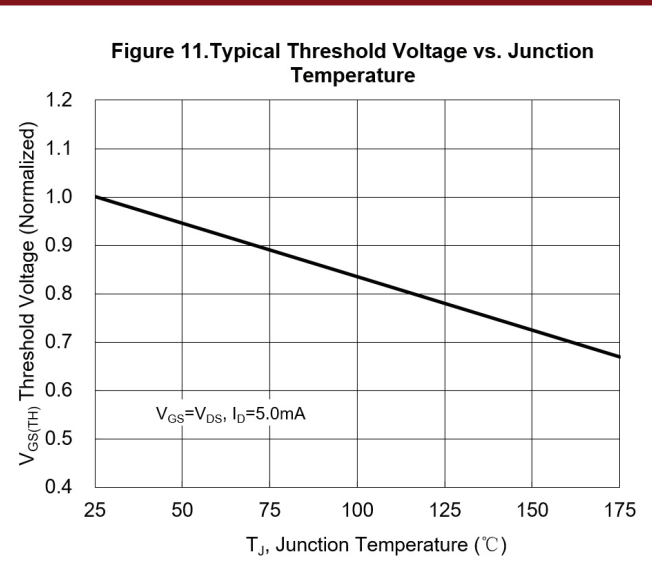


Figure 12.

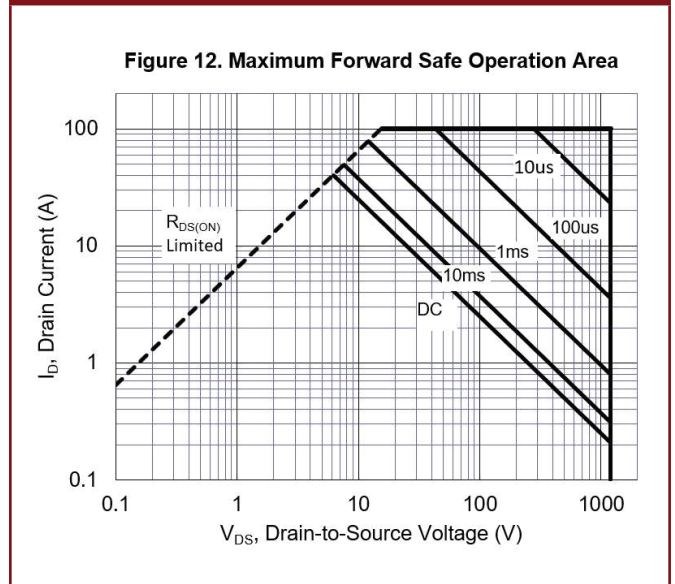


Figure 13.

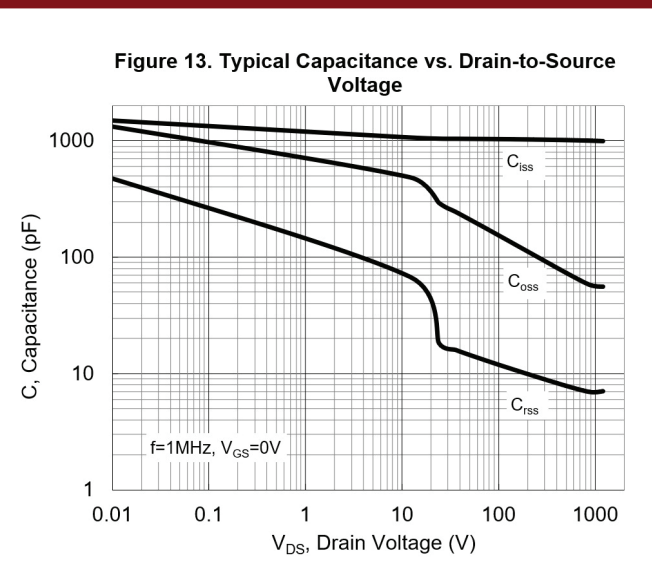
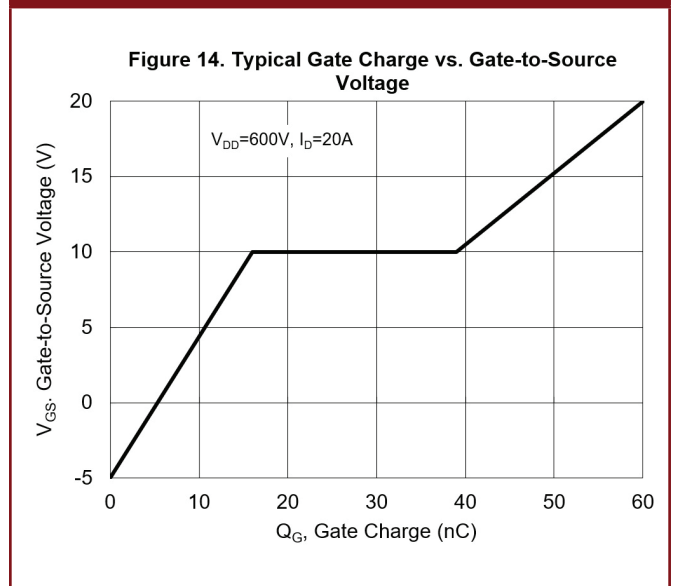


Figure 14.



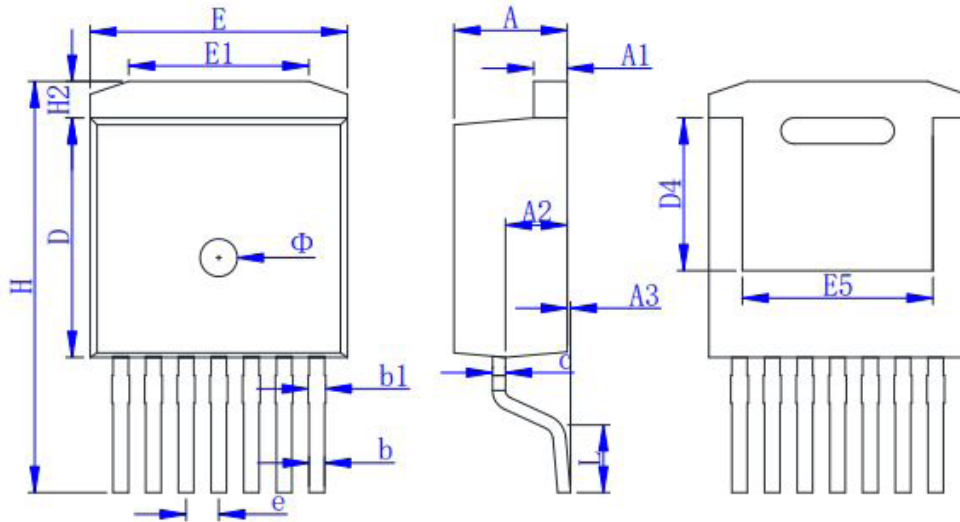
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Package Dimensions

TO-263-7L



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.300	4.430	4.560	0.169	0.174	0.180
A1	1.200	1.300	1.400	0.047	0.051	0.055
A2	2.450	2.600	2.750	0.096	0.102	0.108
A3	0.000	0.130	0.250	0.000	0.005	0.010
b	0.500	0.600	0.700	0.020	0.024	0.028
b1	0.600	0.700	0.900	0.024	0.028	0.035
c	0.450	0.500	0.600	0.018	0.020	0.024
D	8.930	9.080	9.230	0.352	0.357	0.363
D4	4.650	4.800	4.950	0.183	0.189	0.195
E	10.080	10.180	10.280	0.397	0.401	0.405
E1	6.500	7.000	7.500	0.256	0.276	0.295
E5	6.820	7.220	7.620	0.269	0.284	0.300
e	1.27BSC			0.050BSC		
H	15.000	15.500	16.000	0.591	0.610	0.630
H2	0.980	1.200	1.420	0.039	0.047	0.056
L	1.900	2.200	2.500	0.075	0.087	0.098
L1	6.480	6.780	7.080	0.255	0.267	0.279
Φ	1.400	1.500	1.600	0.055	0.059	0.063

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