

GP2T080A120H

V_{DS}	1200 V
$R_{DS,on}$	77 m Ω
I_D (TC=25°C)	35 A
$T_{J,max}$	175°C

QSiC™ 1200V SiC MOSFET

Features

- High speed switching
- Reliable body diode
- All parts tested to above 1400V
- Avalanche tested to 200mJ
- Driver source pin for gate driving
- Increased creepage due to notched design

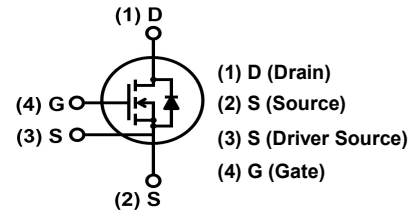
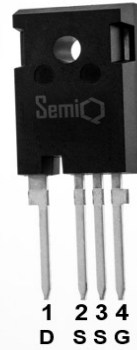
Benefits

- Lower capacitance
- Higher system efficiency
- Easy to parallel
- Lower Qg

Applications

- Solar Inverters
- Switch mode power supplies, UPS
- Induction Heating and Welding
- EV charging stations
- High Voltage DC/DC Converters
- Motor Drives

Package



Part #	Package	Marking
GP2T080A120H	TO-247-4L	2T080A120



Maximum Ratings, at $T_J=25^\circ\text{C}$, unless otherwise specified

Characteristics	Symbol	Conditions	Values	Unit
Drain-Source Voltage	V_{rated}	$V_{GS}=0V, I_D=1\mu A$	1200	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}, V_{GS}=20V$	35	A
		$T_C=100^\circ\text{C}, V_{GS}=20V$	26	
Pulsed Drain Current	$I_{D,pulse}$	$T_C=25^\circ\text{C}$	80	
Gate Source Voltage	V_{GSmax}		-10/25	V
	V_{GSop}	Recommended operational	-5/20	
Power Dissipation	P_{tot}	$T_C=25^\circ\text{C}$	188	W
Operating & Storage Temperature	$T_J, T_{storage}$	Continuous	-55...175	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	$L=1mH, I_{AS}=20.0A, V=50V$	200	mJ

Thermal Characteristics

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal Resistance, Junction to Case	R_{thJC}		-	0.65	0.80	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	R_{thJA}		-	-	40.0	

Static Electrical Characteristics, at T_J=25°C, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =1mA	1200	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V	-	0.1	1.0	μA
		V _{DS} =1200V, V _{GS} =0V, T _J =175°C	-	1	-	
Gate-Source Leakage Current	I _{GSS+}	V _{GS} =20V, V _{DS} =0V	-	10	100	nA
	I _{GSS-}	V _{GS} =-5V, V _{DS} =0V	-	-10	-100	
Gate Threshold Voltage	V _{GS(th)}	V _{GS} =V _{DS} , I _D =10mA	1.8	2.8	4	V
		V _{GS} =V _{DS} , I _D =10mA, T _J =125°C	-	2.1	-	
		V _{GS} =V _{DS} , I _D =10mA, T _J =175°C	-	1.9	-	
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =20V, I _D =20A	-	77	100	mΩ
		V _{GS} =20V, I _D =10A	-	71	90	
		V _{GS} =20V, I _D =20A, T _J =125°C	-	106	-	
		V _{GS} =20V, I _D =20A, T _J =175°C	-	134	-	
Gate Input Resistance	R _G	f=1MHz, VAC=25mV, D-S Short	-	3.0	-	Ω

AC Electrical Characteristics, at T_J=25°C, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Input Capacitance	C _{ISS}	V _{GS} =0V V _{DS} =1000V f=200kHz, Vac=25mV	-	1377	-	pF
Output Capacitance	C _{OSS}		-	62	-	
Reverse Transfer Capacitance	C _{RSS}		-	4	-	
Coss Stored Energy	E _{OSS}		-	38	-	
Turn-On Switching Energy	E _{ON}	V _{DD} =800V, I _{DS} =20A, R _{G(ext)} =2.5Ω,	-	208	-	μJ
Turn-Off Switching Energy	E _{OFF}	V _{GS} =-5/+20V, L=975μH,	-	25	-	
Total Switching Energy	E _{TOT}	FWD = GP2T080A120H	-	233	-	
Turn-On Switching Energy	E _{ON}	V _{DD} =800V, I _{DS} =20A, R _{G(ext)} =2.5Ω,	-	167	-	μJ
Turn-Off Switching Energy	E _{OFF}	V _{GS} =-5/+20V, L=975μH,	-	27	-	
Total Switching Energy	E _{TOT}	FWD = GP3D010A120A	-	194	-	
Turn-On Delay Time	t _{D(on)}	V _{DD} =800V, I _{DS} =20A,	-	9	-	ns
Rise Time	t _R	R _{G(ext)} =2.5Ω, V _{GS} =-5V/20V,	-	4	-	
Turn-Off Delay Time	t _{D(off)}	L=975μH,	-	15	-	
Fall Time	t _F	FWD = GP2T080A120H	-	10	-	
Total Gate Charge	Q _G	V _{DD} =800V, I _{DS} =20A V _{GS} =-5/20V	-	61	-	nC
Gate to Source Charge	Q _{GS}		-	24	-	
Gate to Drain Charge	Q _{GD}		-	14	-	

Body Diode Characteristics, at T_J=25°C, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Max Continuous Diode Fwd Current	I _S	V _{GS} =-5V, T _C =25°C	-	-	43	A
Diode Forward Voltage	V _{SD}	V _{GS} =-5V, I _S =10A	-	3.8	-	V
Reverse Recovery Time	t _{RR}	I _S =20A, V _R =800V, V _{GS} =-5V di _F /dt=8.0A/ns	-	8	-	ns
Reverse Recovery Charge	Q _{RR}		-	130	-	nC
Peak Reverse Recovery Current	I _{RPM}		-	29	-	A

Typical Performance

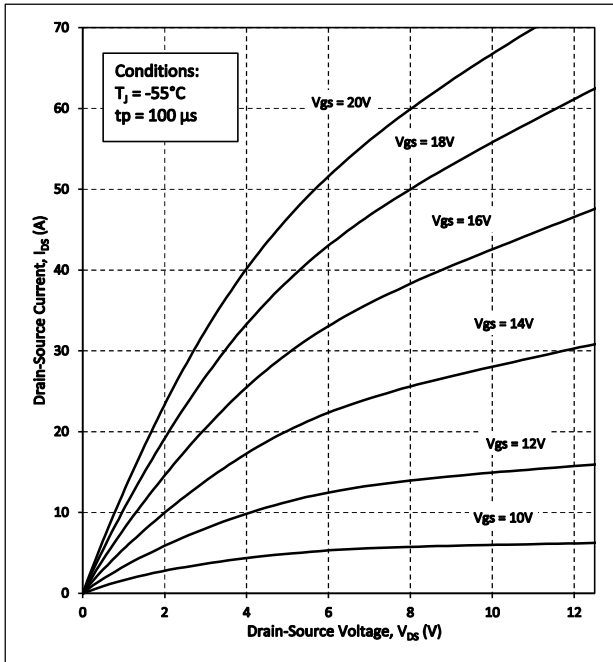


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

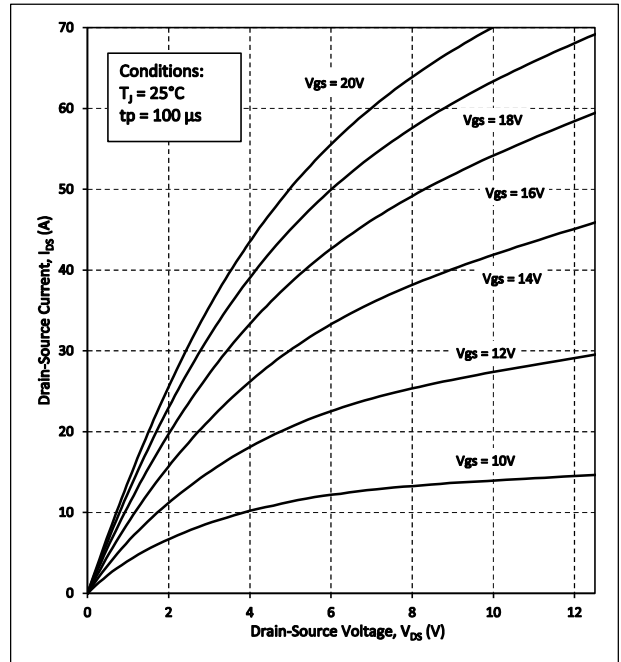


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

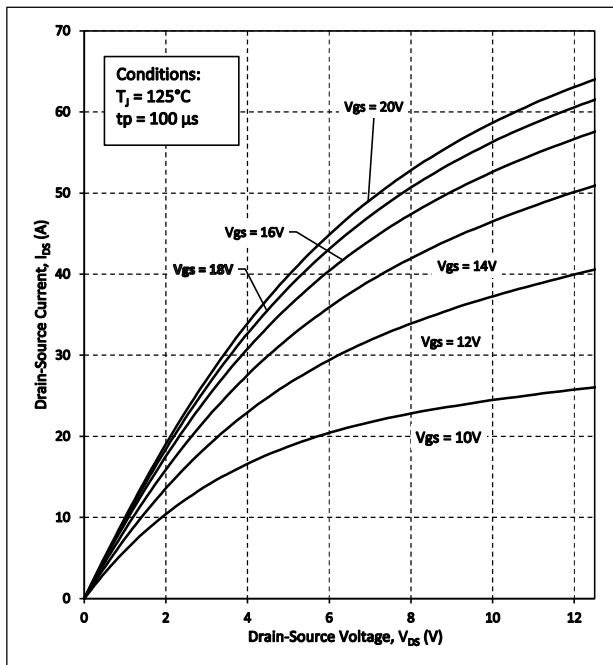


Figure 3. Output Characteristics $T_j = 125^\circ\text{C}$

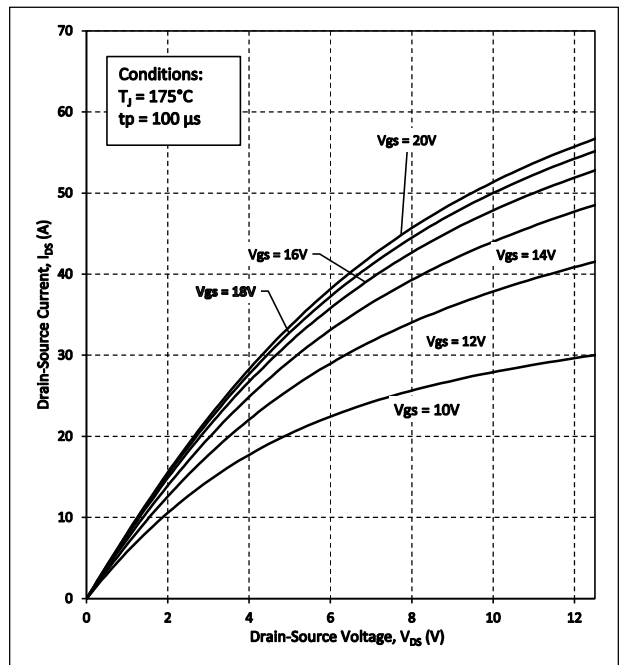


Figure 4. Output Characteristics $T_j = 175^\circ\text{C}$

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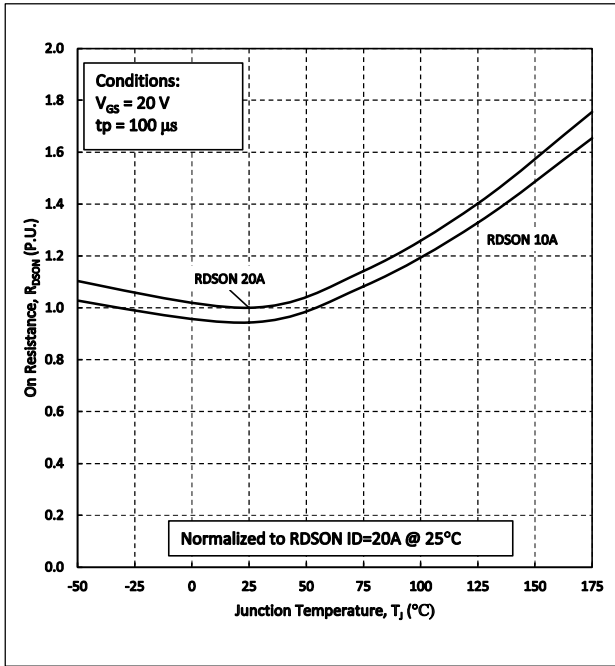


Figure 5. Normalized On-Resistance vs. Temperature

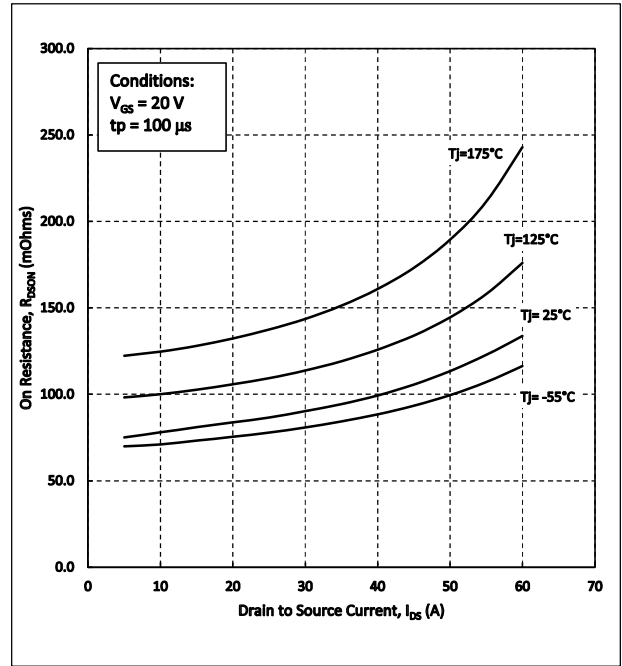


Figure 6. On-Resistance vs. Drain Current For Various Temperature

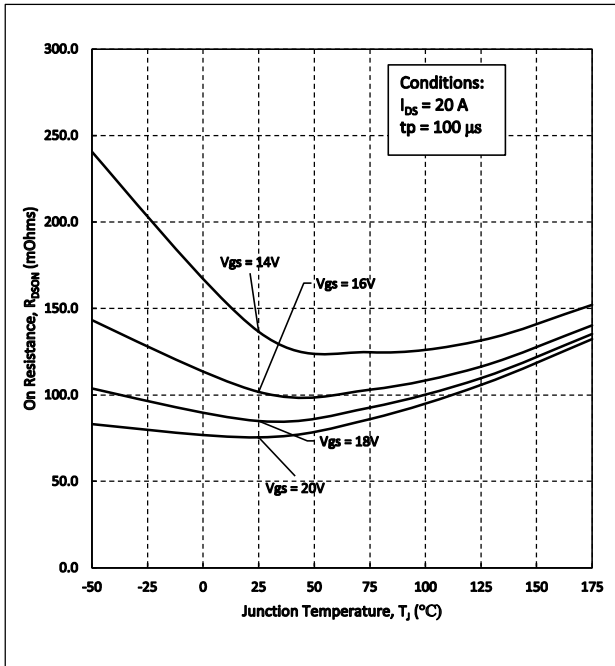


Figure 7. On-Resistance vs. Temperature For Various Gate Voltages

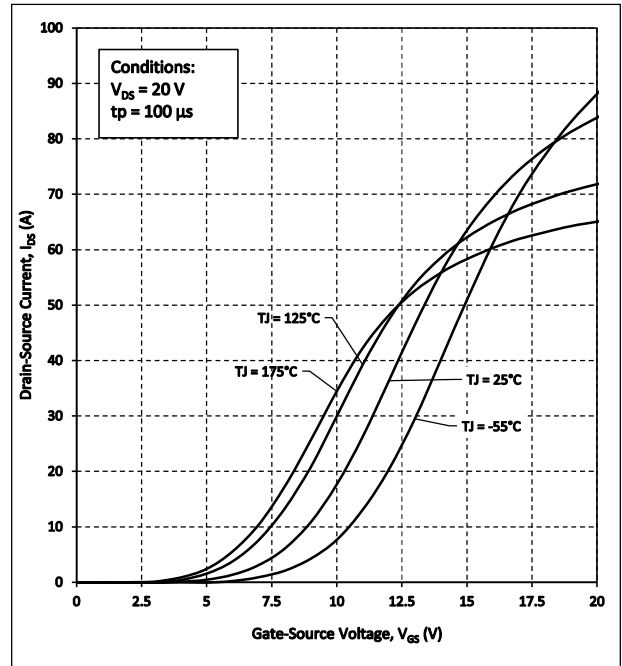


Figure 8. Transfer Characteristic for Various Junction Temperatures

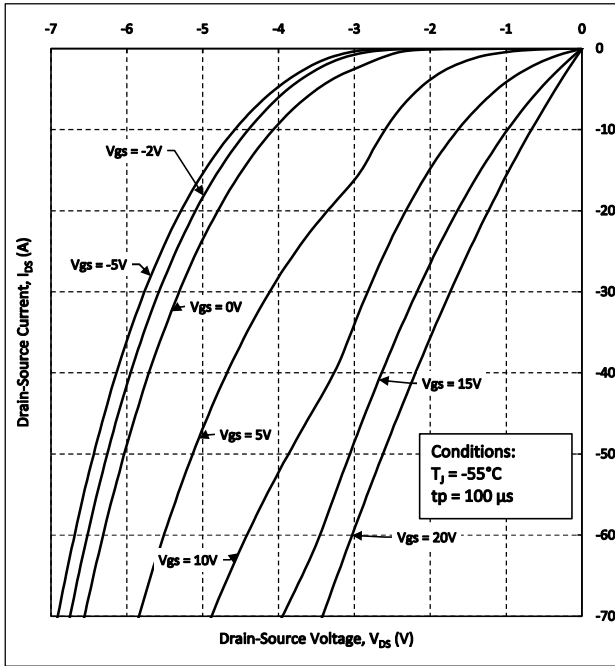


Figure 9. Body Diode Characteristics at $T_J = -55^\circ\text{C}$

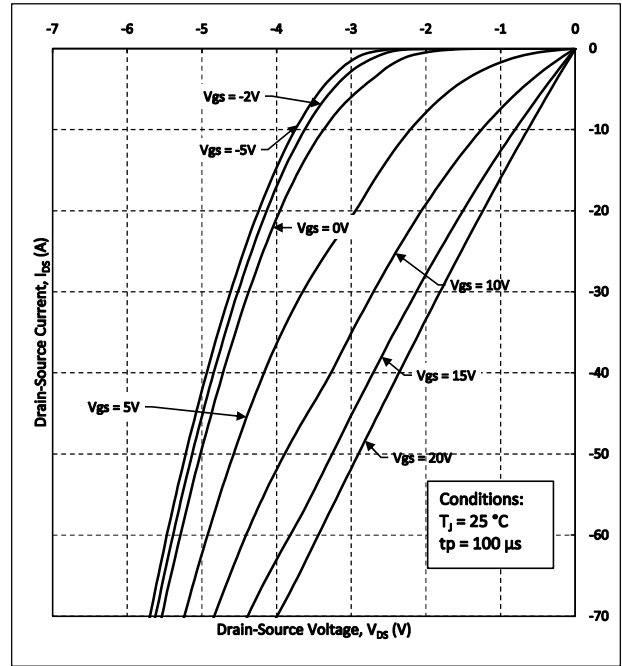


Figure 10. Body Diode Characteristics at $T_J = 25^\circ\text{C}$

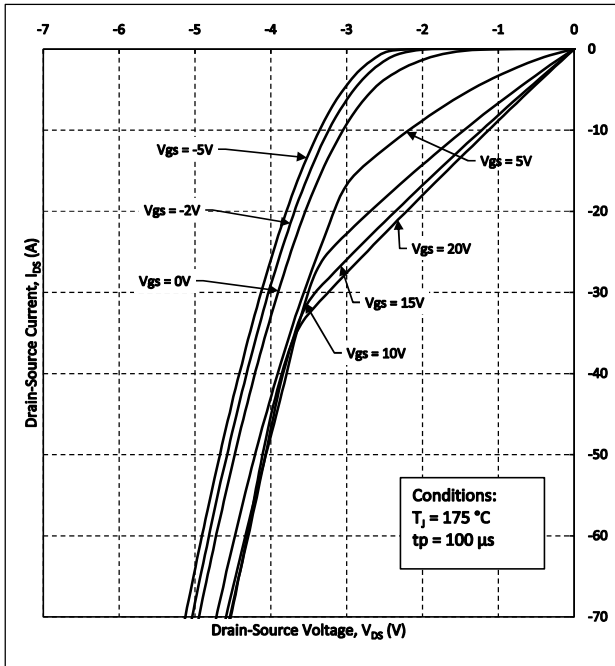


Figure 11. Body Diode Characteristics at $T_J = 175^\circ\text{C}$

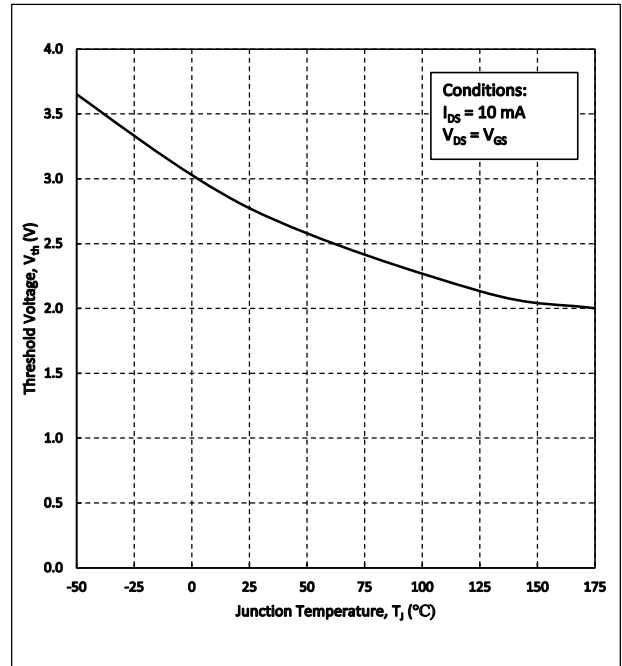


Figure 12. Threshold Voltage vs. Temperature

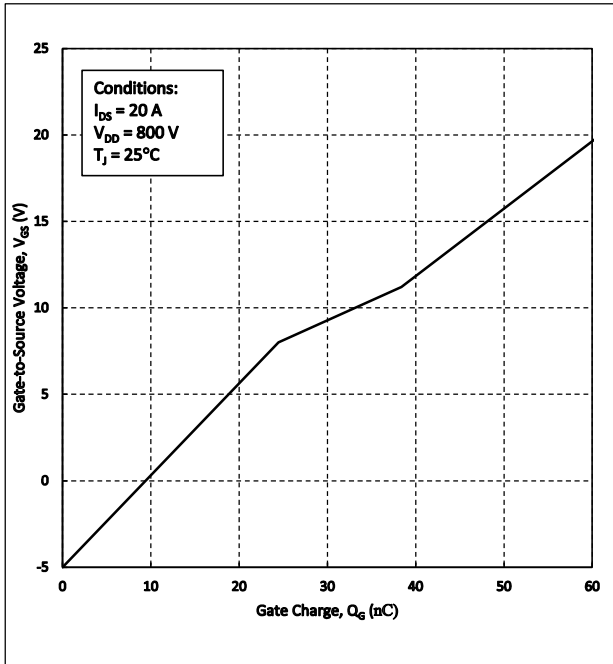


Figure 13. Gate Charge Characteristics

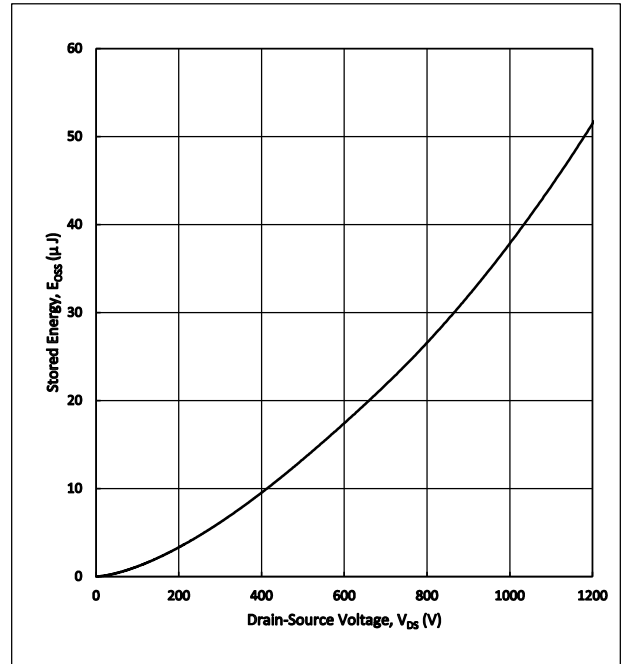


Figure 14. Output Capacitor Stored Energy

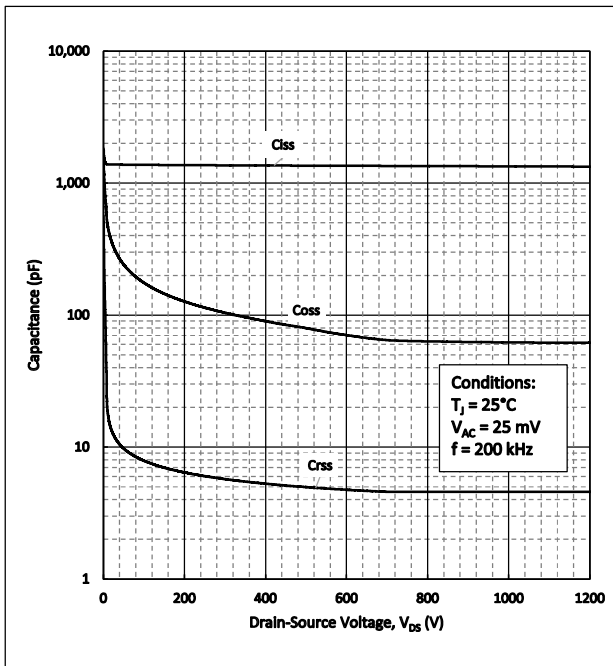


Figure 15. Capacitance vs Drain-Source Voltage

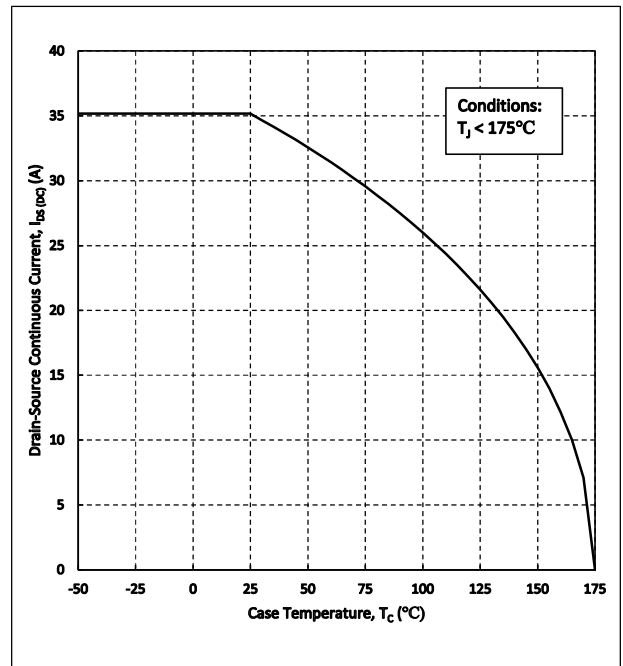


Figure 16. Continuous Drain Current Derating vs. Case Temperature

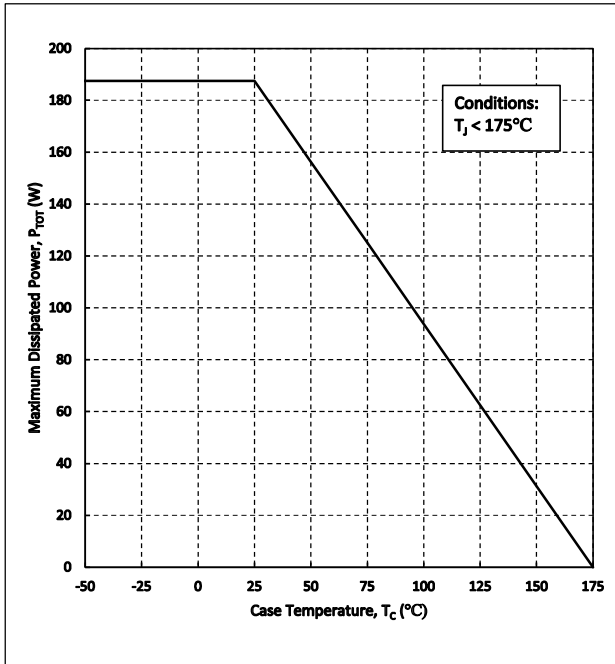


Figure 17. Maximum Power Dissipation Derating vs Case Temperature

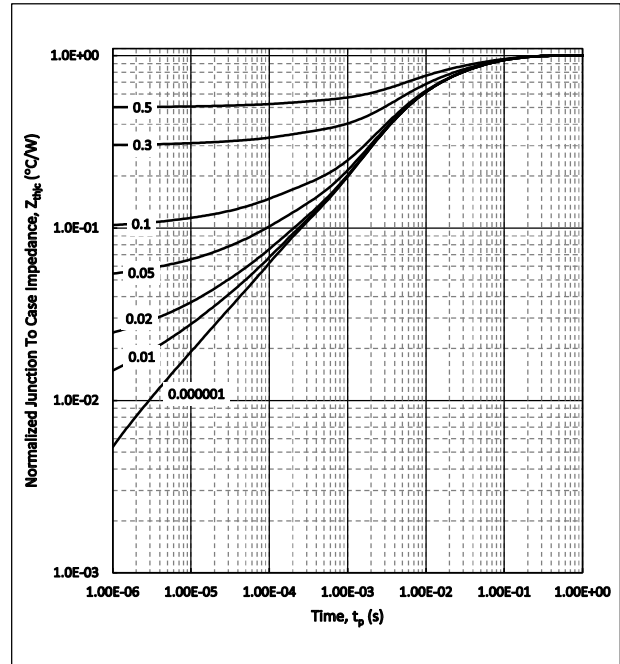


Figure 18. Transient Thermal impedance (Junction to Case)

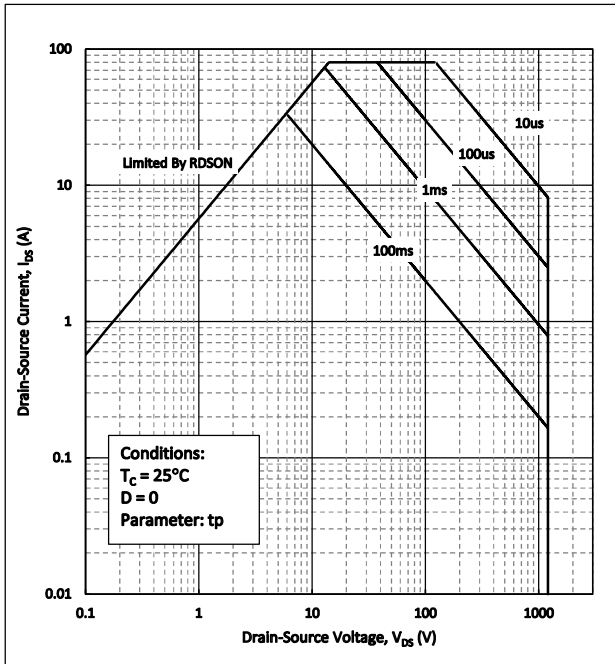


Figure 19. Safe Operating Area

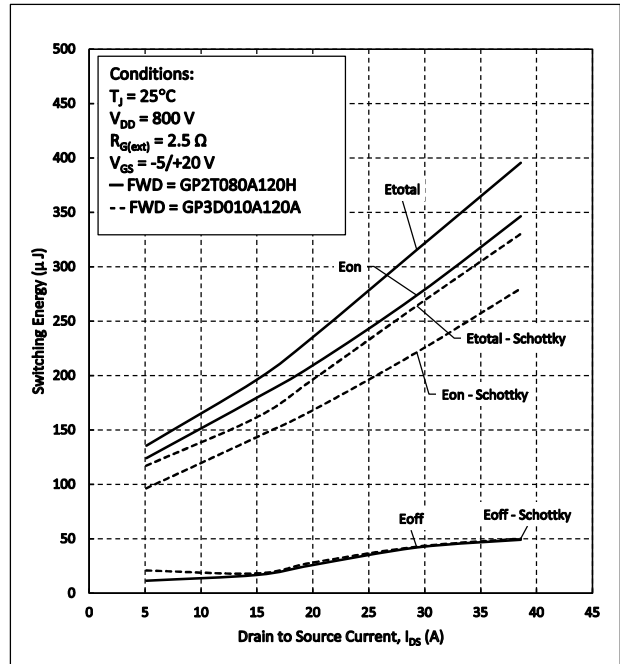


Figure 20. Clamped Inductive Switching Energy vs. Drain Current

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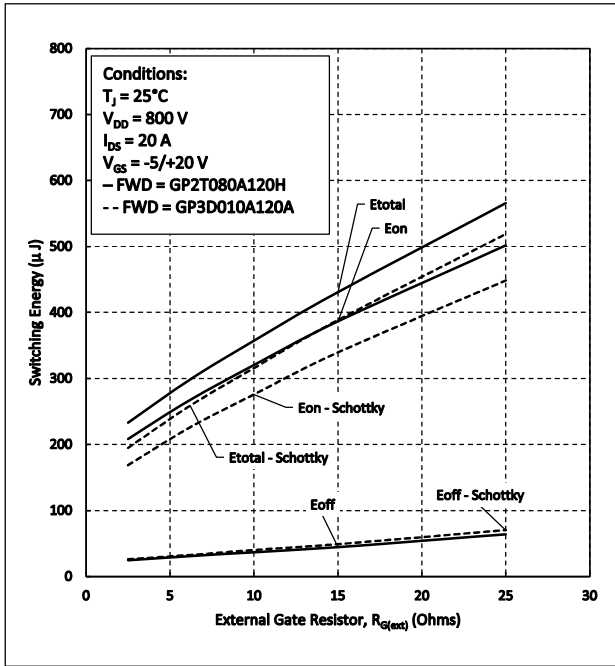


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(\text{ext})}$

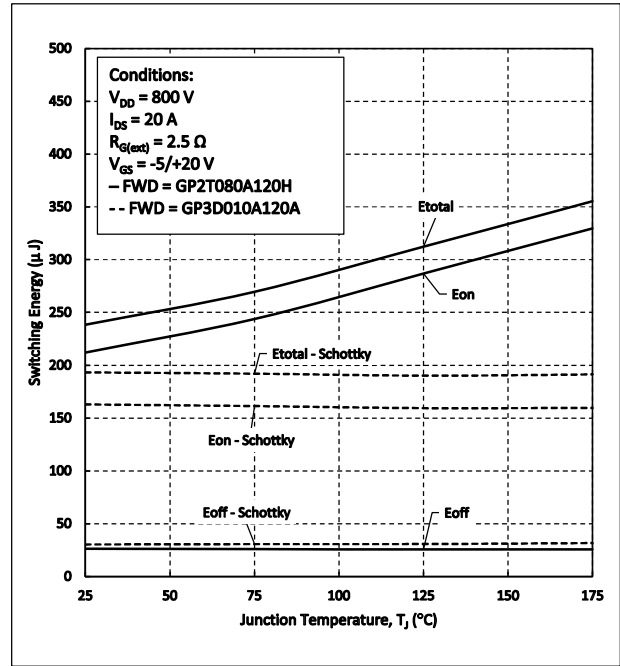


Figure 22. Clamped Inductive Switching Energy vs. Temperature

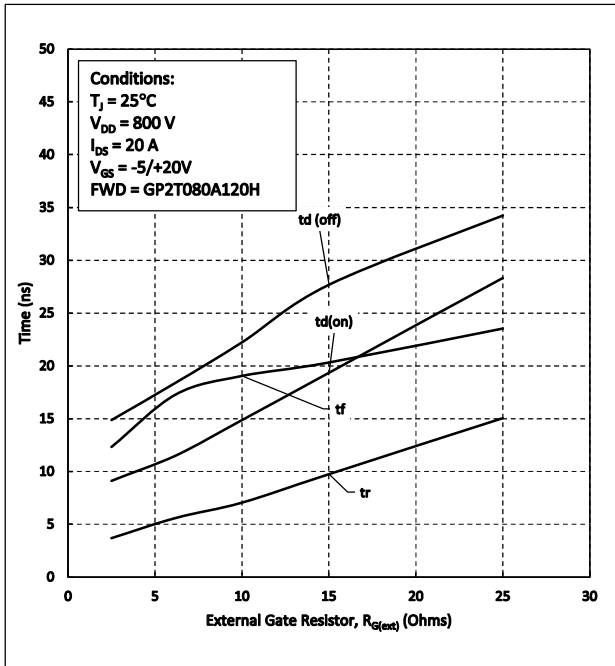


Figure 23. Switching Times vs $R_{G(\text{ext})}$

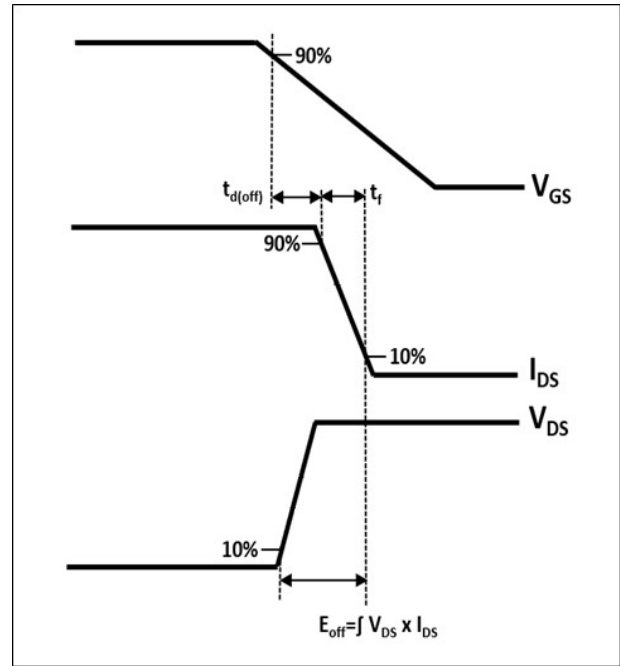


Figure 24. Turn-off Transient Definitions

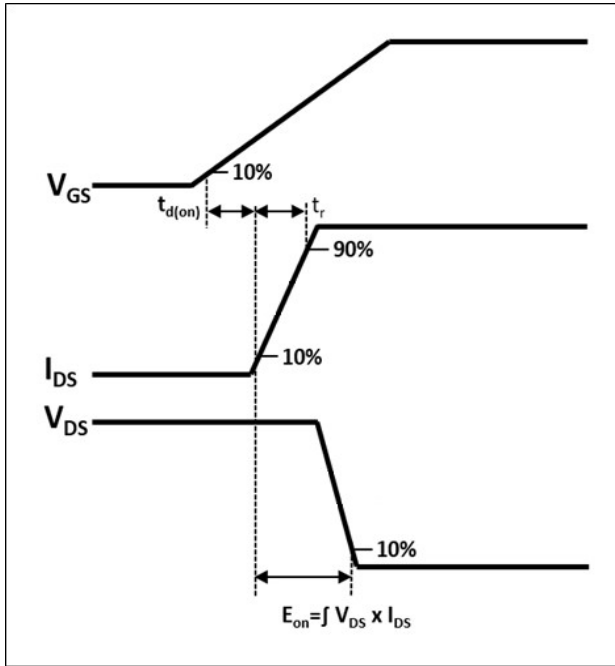


Figure 25. Turn-on Transient Definitions

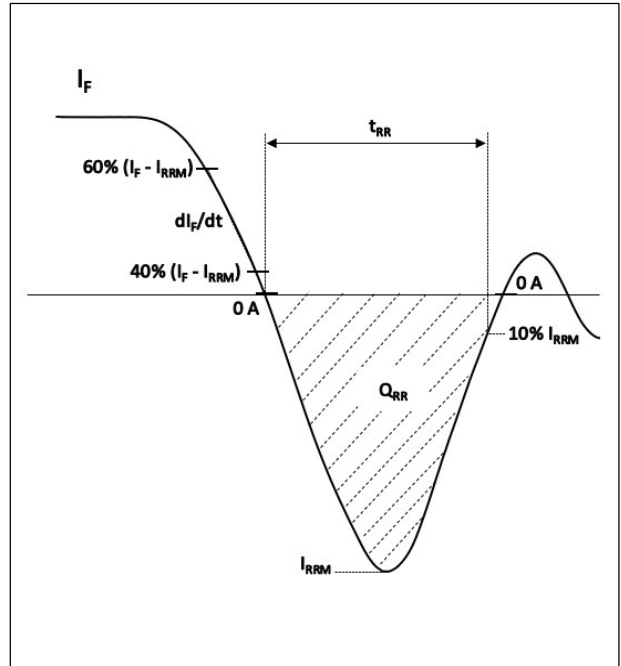
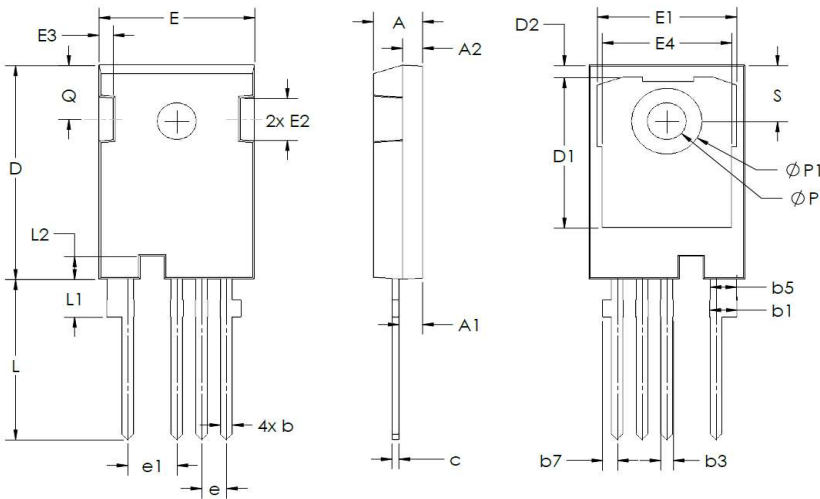


Figure 26. Reverse Recovery Definitions

Package Dimensions TO-247-4L



Sym	Millimeters		Inches	
	Min	Max	Min	Max
A	4.83	5.21	0.190	0.205
A1	2.29	2.54	0.090	0.100
A2	1.91	2.16	0.075	0.085
b	1.07	1.33	0.042	0.052
b1	2.39	2.94	0.094	0.116
b3	1.07	1.60	0.042	0.063
b5	2.39	2.69	0.094	0.106
b7	1.30	1.70	0.051	0.067
c	0.55	0.68	0.022	0.027
c1	0.55	0.65	0.022	0.026
D	23.30	23.60	0.917	0.929
D1	16.25	17.65	0.640	0.695
D2	0.95	1.25	0.037	0.049
E	15.75	16.13	0.620	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	1.90	0.039	0.075
E4	12.38	13.43	0.487	0.529
e	2.54 BSC		0.100 BSC	
e1	5.08 BSC		0.200 BSC	
L	17.31	17.82	0.681	0.702
L1	3.97	4.37	0.156	0.172
L2	2.35	2.65	0.093	0.104
phi P	3.51	3.65	0.138	0.144
phi P1	7.19 REF		0.283 REF	
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

Notes**RoHS Compliance**

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.SemiQ.com.

REACH Compliance

REACH substances of high concern (SVHC) information is available for this product. Since the European Chemicals Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at SemiQ Headquarters in Lake Forest, California to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

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