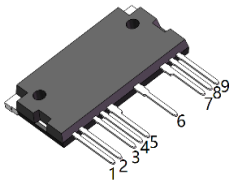
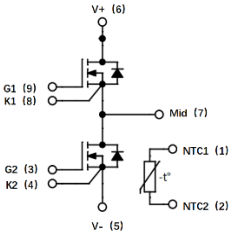
Features

- Low switching losses
- Low gate charge
- Fast High frequency operation
- Fast reverse recovery body diode
- Tight variation of $R_{DS(on)}$ with temperature

V_{DS}	1200V
I_D (T_C = 25°C)	44.9A
$R_{DS(on)}$	80mΩ



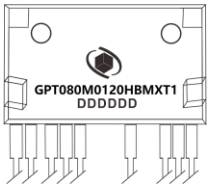
TO-247-9L



Inner Circuit

Benefits

- Increase efficiency
- Increase power density
- Reduce cooling requirements
- Reduce system cost



GPT = GPT
080 = $R_{DS(on)}$ 80mΩ
M = SiC MOSFET
0120 = Voltage Rating 1200V
HBMXT1 = Half-bridge power module
DDDDDD = Traceable code

Applications

- Solar inverters
- EV charging
- Switch mode power supplies
- Motor drives
- Energy Storage
- UPS

Maximum Ratings (at T_J = 25 °C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	1200	V
Gate-Source Voltage Max Transient Voltage, <1% duty cycle Recommend Drive Voltage	 V_{GSS} $V_{GS(op)}$	 -10/+22 -3/+18	V
Continuous Drain Current V_{GS} = 18V, T_C = 25°C V_{GS} = 18V, T_C = 100°C	I_D	 44.9 33	A
Pulsed Drain Current Pulse width t_p limited by T_{jmax}, V_{GS} = 18V	$I_{D,pulse}$	75	A
Power Dissipation T_C = 25°C T_C = 110°C	P_{tot}	 250 109	W
Operating Junction Range	T_J	-55 to +175	°C
Storage Temperature Range	T_{stg}	-55 to +150	°C
Soldering Temperature 1.6mm (0.063") from case for 10s	T_L	260	°C

Insulation Properties

Parameter	Symbol	Value	Unit
Insulation Test Voltage RMS, f = 50Hz, t = 1min	V_{is}	3000	V
Creepage Distances		10.16	mm

Thermal Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Thermal Resistance, junction-case	$R_{th(j-c)}$		-	0.6	-	°C /W

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

Static Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 100μA	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = 0 V T_J = 25°C T_J = 175°C	 - -	 0.07 9.7	 100 -	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 22V, V_{DS} = 0V V_{GS} = -10V, V_{DS} = 0V	- -	- -	100 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 5mA T_J = 25°C T_J = 175°C	 2 -	 3.3 2.2	 5 -	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 18V, I_D = 20A T_J = 25°C T_J = 175°C	 - -	 80 106	 100 -	mΩ
Transconductance	g_{fs}	I_D = 20A T_J = 25°C T_J = 175°C	 - -	 7.9 9	 - -	S
Internal Gate Resistance	$R_{G(int)}$	f = 1MHz, V_{AC} = 25mV	-	2.3	-	Ω

Dynamic Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Input Capacitance	C_{iss}	V_{DS} = 800V, V_{GS} = 0V f = 1MHz, V_{AC} = 25mV	-	2367	-	pF
Output Capacitance	C_{oss}		-	134.6	-	
Reverse Transfer Capacitance	C_{rss}		-	9.6	-	
C_{OSS} Stroed Energy	E_{oss}		-	87	-	μJ
Total Gate Charge	Q_G	V_{DD} = 800V, I_D = 20A V_{GS} = -3/18V, turn-on pulse	-	86	-	nC
Gate to Source Charge	Q_{GS}		-	26	-	
Gate to Drain Charge	Q_{GD}		-	32	-	

Switching Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 800V, I_D = 20A V_{GS} = -3/18V, $R_{G(ext)}$ = 4.7Ω L_σ = 100μH Body diode at V_{GS} = -3V Inductive load	-	27.7	-	ns
Rise time	t_r		-	32.3	-	
Turn-off delay time	$T_{d(off)}$		-	26.9	-	
Fall Time	t_f		-	11.2	-	
Turn-on Switching Energy	E_{on}		-	468.7	-	μJ
Turn-off Switching Energy	E_{off}		-	79.5	-	
Total Switching Energy	E_{tot}		-	548.2	-	

Body Diode Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Diode Forward Voltage	V_{SD}	V_{GS} = 0V, I_{SD} = 10A, T_J = 25°C T_J = 175°C	 - -	 3.13 2.83	 - -	V
Continuous Diode Forward Current	I_{SD}	V_{GS} = -3V, T_C = 25°C V_{GS} = -3V, T_C = 100°C	- -	- -	61.9 34.9	A
Revers Recovery Time	t_{rr}	V_{DD} = 800V, I_D = 20A V_{GS} = -3V, di/dt = 1000A/us T_J = 25°C	-	15.6	-	ns
Revers Recovery Charge	Q_{rr}		-	75	-	nC
Peak Revers Recovery Current	I_{rrm}		-	8.2	-	A

Thermistor

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Resistor	R_{25}	T = 25 ± 0.01°C	-	5	-	KΩ
Deviation of R_{100}	ΔR/R	T = 100°C, R_{100} = 493Ω	-5	-	5	%
Maximum Power Rating	Pr	T = 25 ± 0.5°C	-	-	60	mV
B-constant of NTC	$B_{25/50}$	$B = (\ln(R_{T1})-\ln(R_{T2}))/(1/T_1-1/T_2)$	-	3375	-	K
B-constant of NTC	$B_{25/80}$	$B = (\ln(R_{T1})-\ln(R_{T2}))/(1/T_1-1/T_2)$	-	3414	-	K
B-constant of NTC	$B_{25/100}$	$B = (\ln(R_{T1})-\ln(R_{T2}))/(1/T_1-1/T_2)$	-	3456	-	K

Typical Characteristics Curves

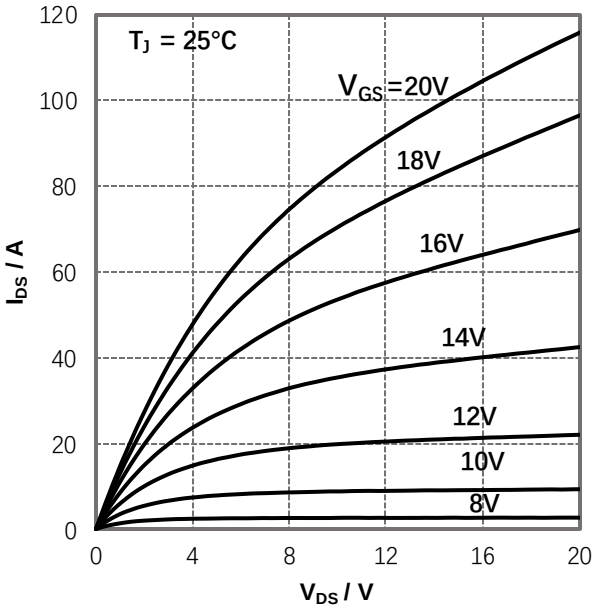


Figure 1. Output Characteristics T_J=25℃

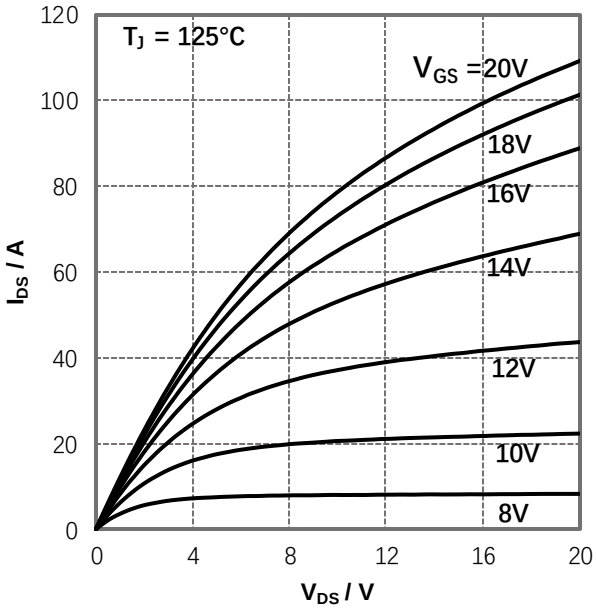


Figure 2. Output Characteristics T_J=125℃

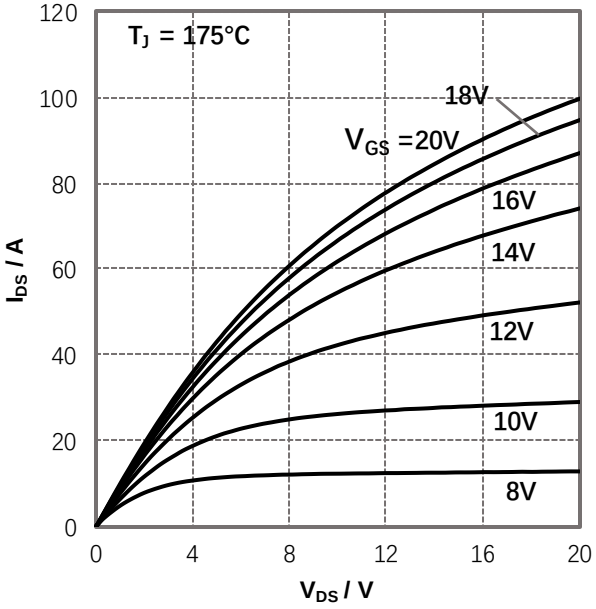


Figure 3. Output Characteristics T_J=175℃

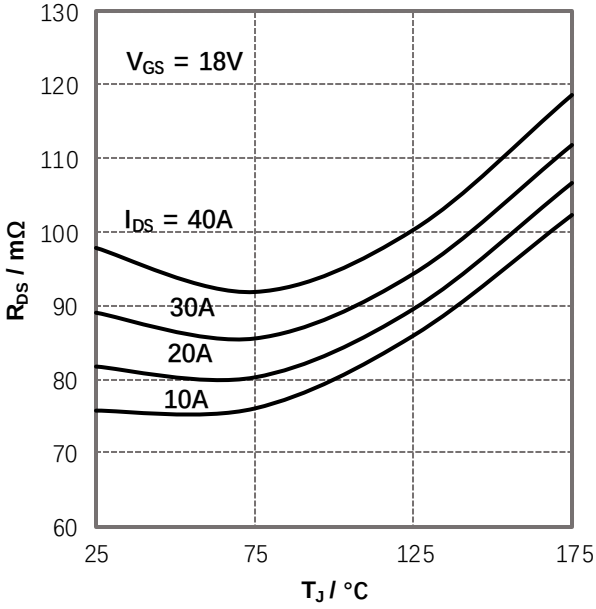


Figure 4. On-Resistance vs. Temperature For Various Drain Current

Typical Characteristics Curves

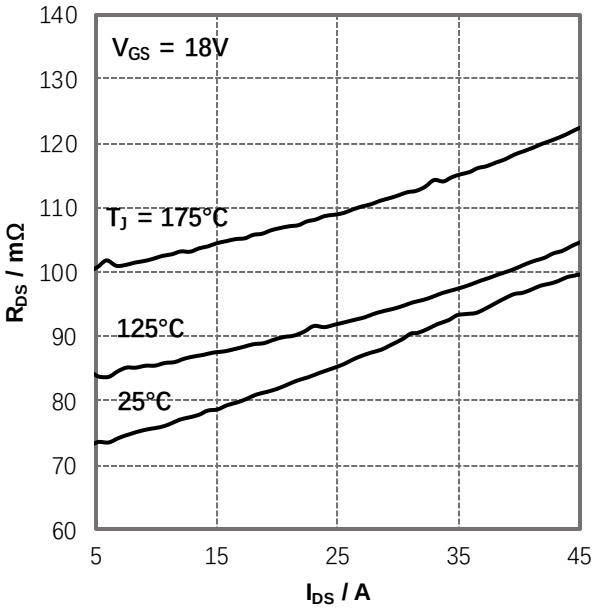


Figure 5. On-Resistance vs. Drain Current For Various Temperature

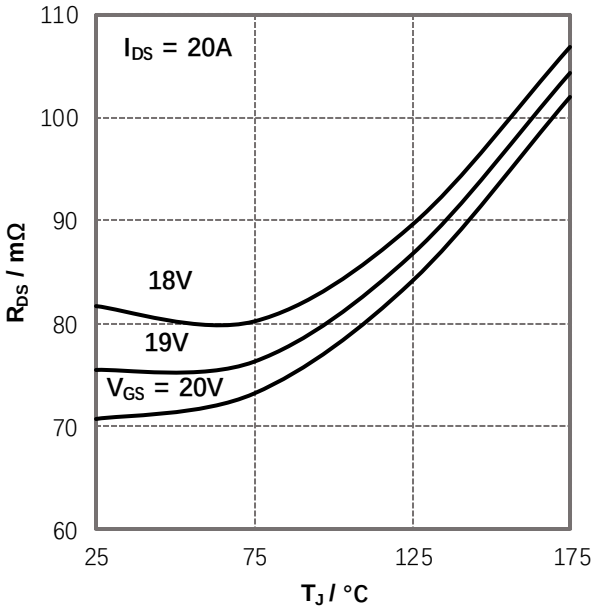


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

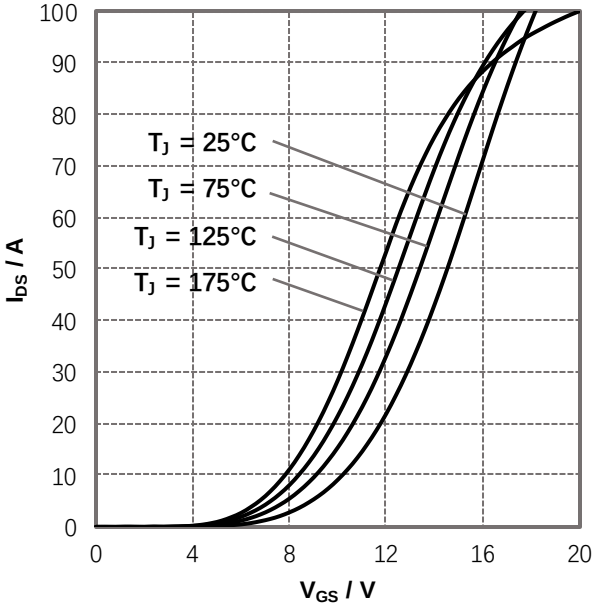


Figure 7. Transfer Characteristics

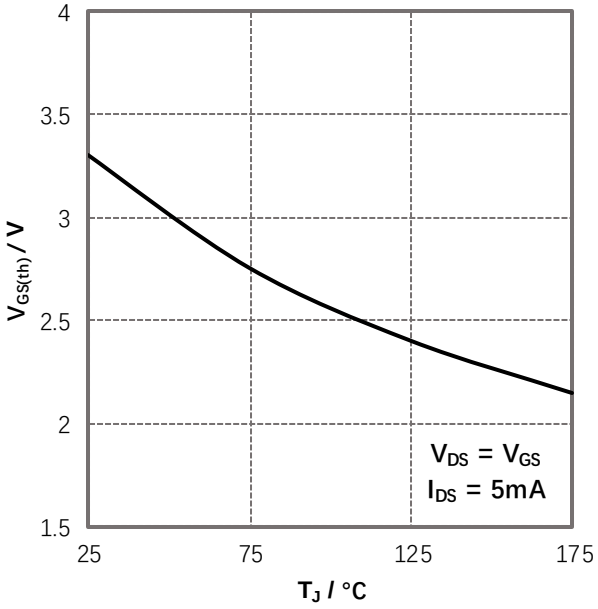


Figure 8. Threshold Voltage vs. Temperature

Typical Characteristics Curves

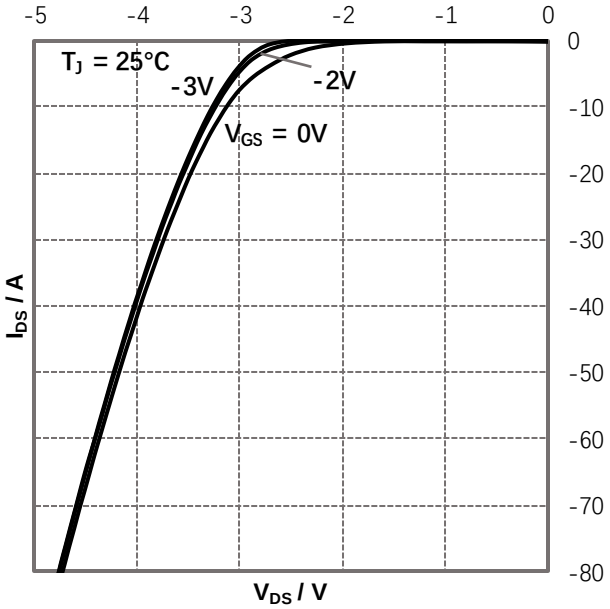


Figure 9. Body Diode Characteristics T_J=25℃

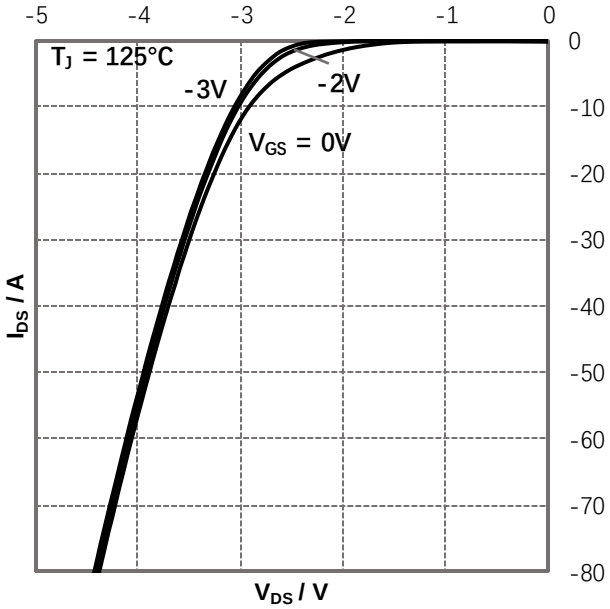


Figure 10. Body Diode Characteristics T_J=·125℃

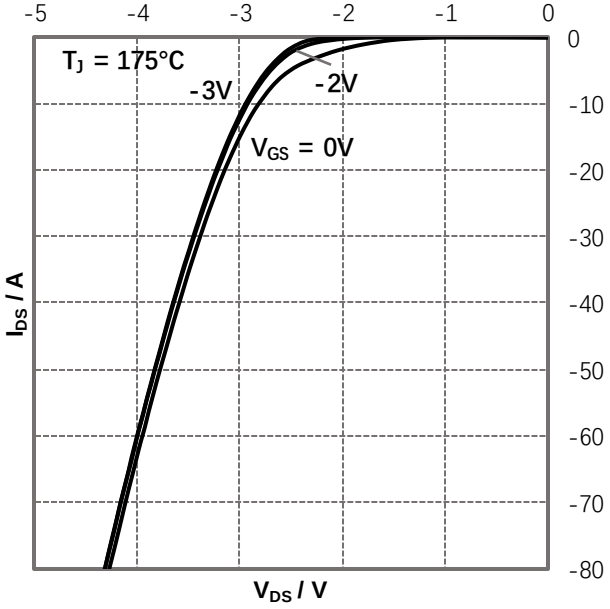


Figure 11. Body Diode Characteristics T_J=·175℃

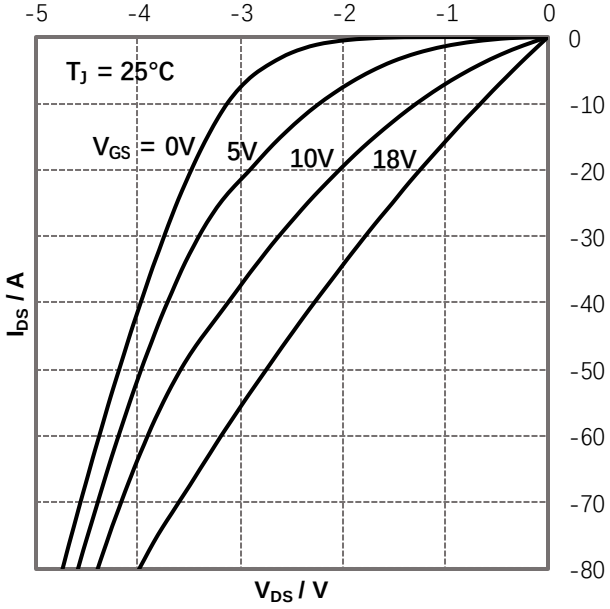


Figure 12. 3rd Quadrant Characteristics T_J=·25℃

Typical Characteristics Curves

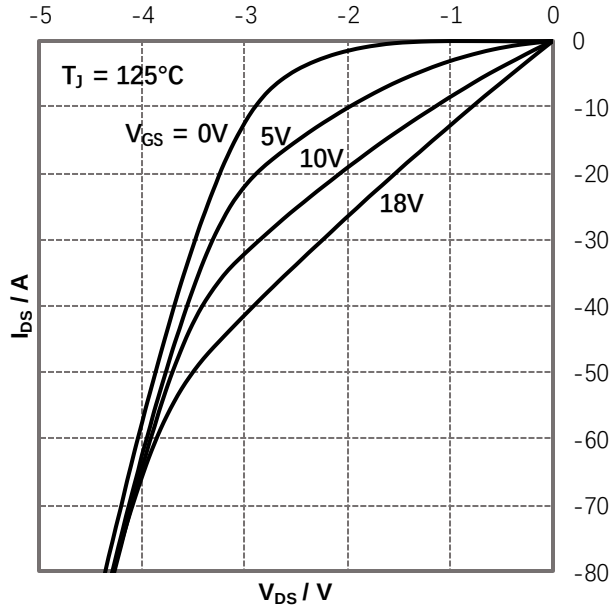


Figure 13. 3rd Quadrant Characteristics T_J=·125℃

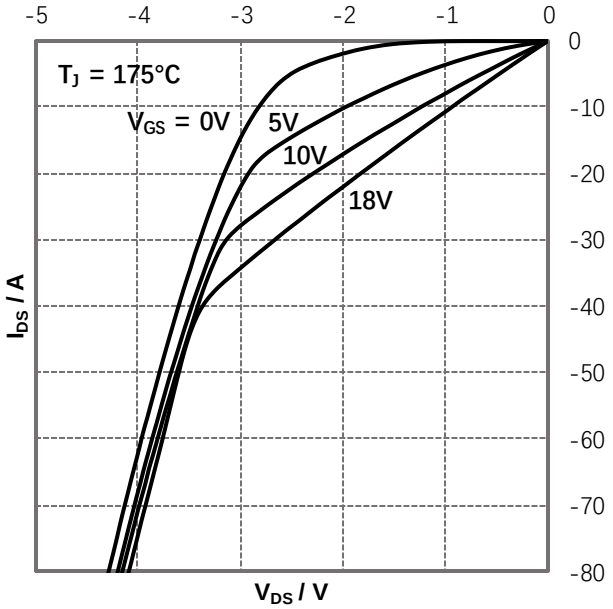


Figure 14. 3rd Quadrant Characteristics T_J=·175℃

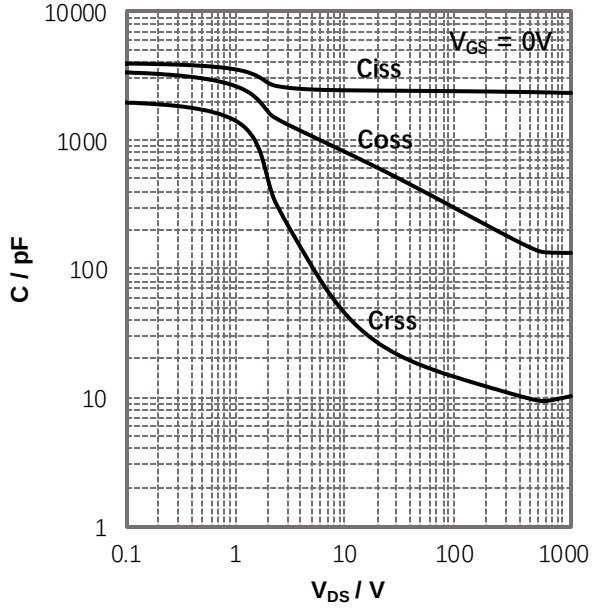


Figure 15. Capacitances vs. Drain-Source Voltage

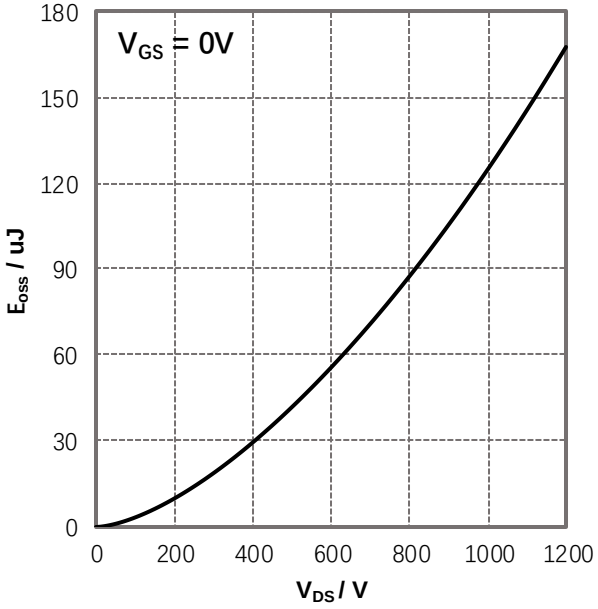


Figure 16. Output Capacitor Stored Energy

Typical Characteristics Curves

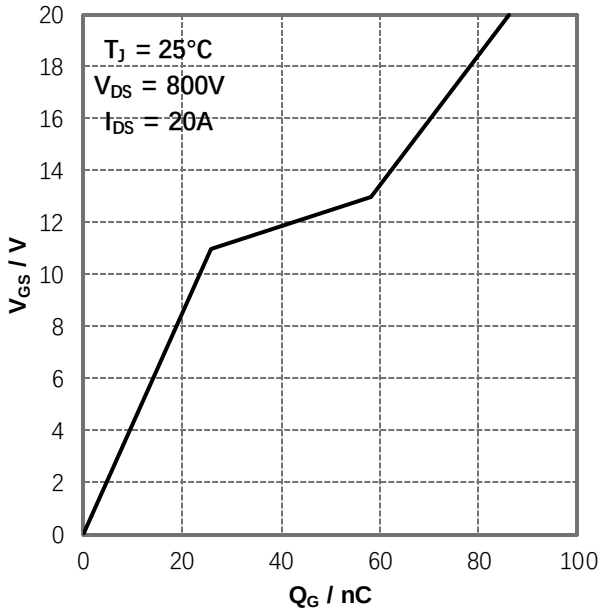


Figure 17. Gate Charge Characteristics

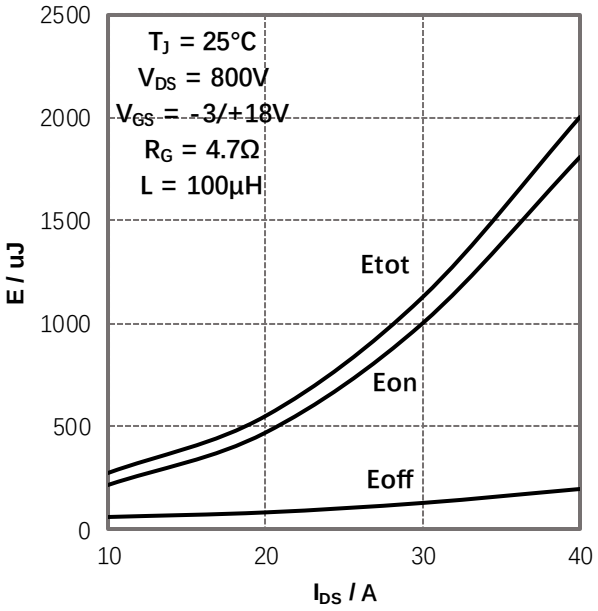


Figure 18. Switching Energy vs. Drain Current

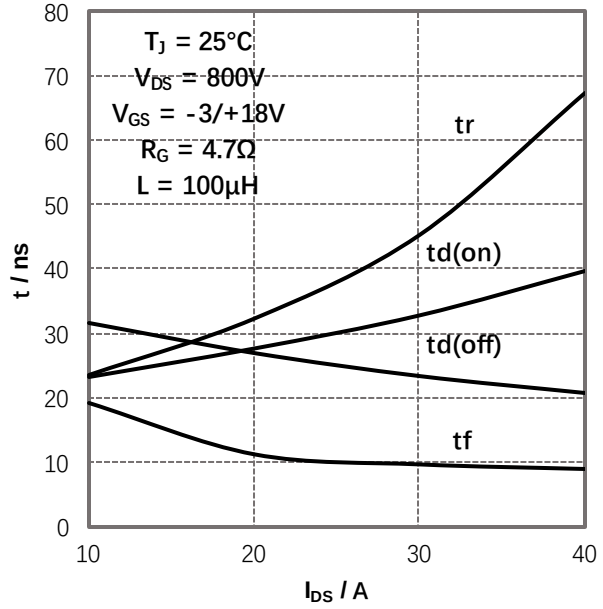


Figure 19. Switching Time vs. Drain Current

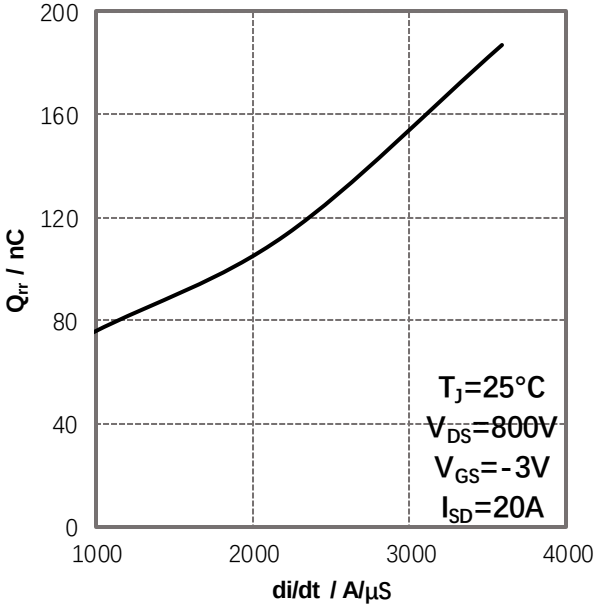


Figure 20. Reverse Recovery Charge vs. di/dt

Typical Characteristics Curves

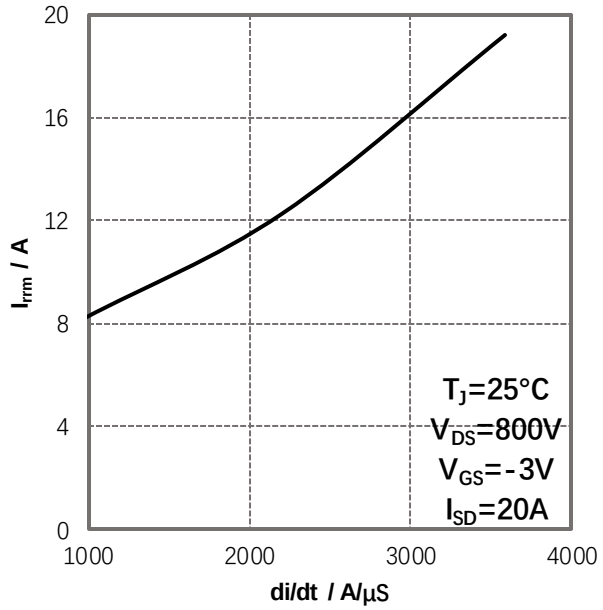


Figure 21. Reverse Recovery Current vs. di/dt

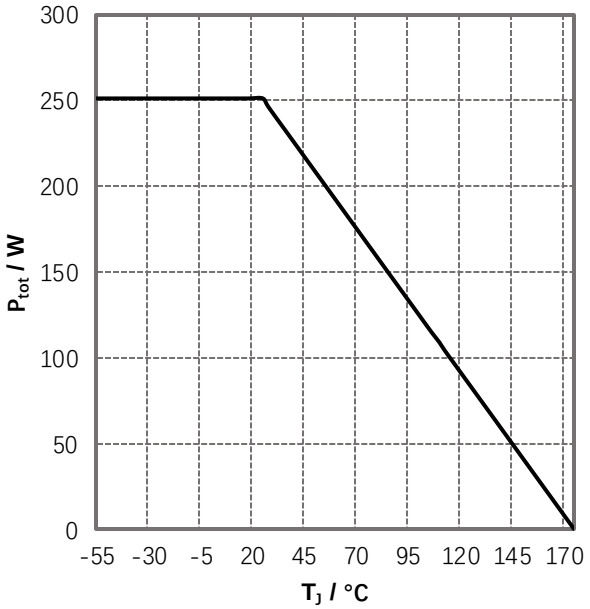


Figure 22. Power Dissipation Derating

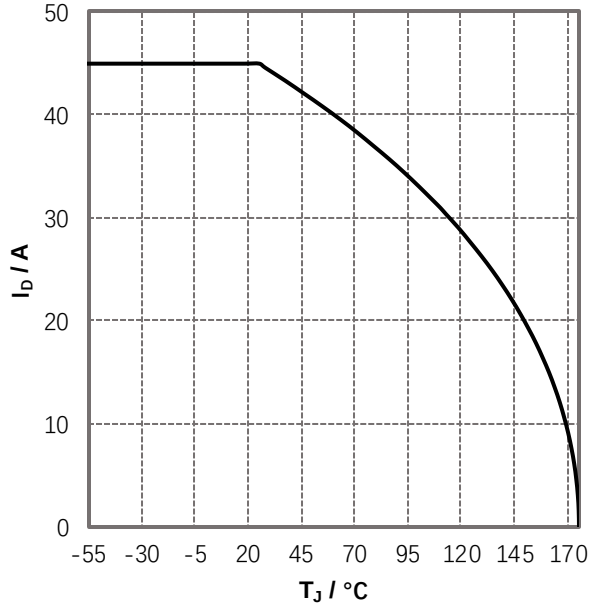


Figure 23. Continuous Drian Current Derating

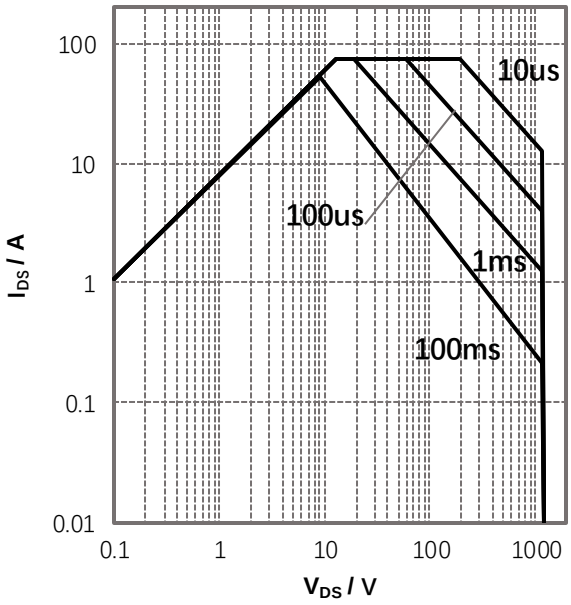


Figure 24. Safe Operating Area

Typical Characteristics Curves

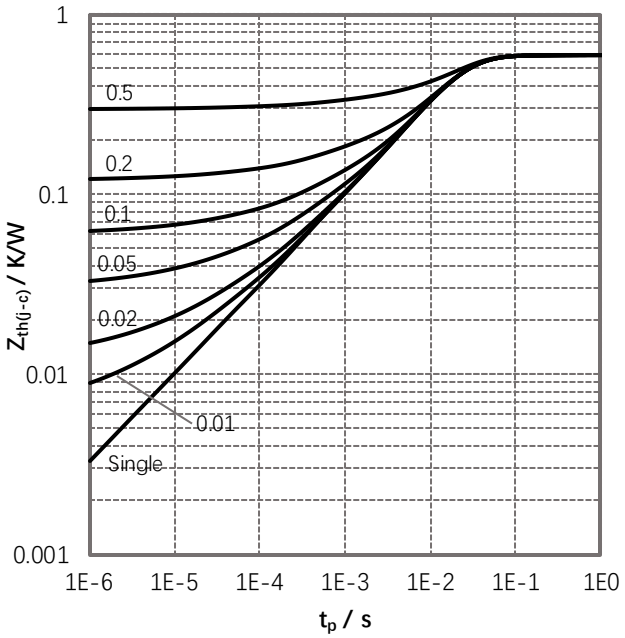
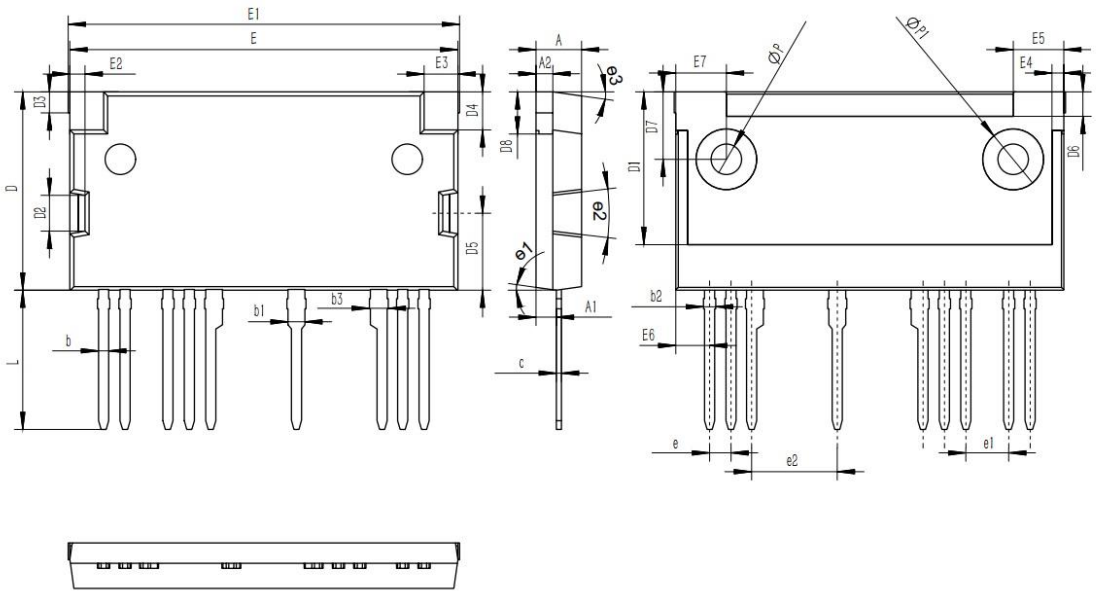


Figure 25. Transient Thermal Impedance (Junction-Case)

Package Dimensions * is the key control dimension



Ref	Dimensions		
	Min	Nom	Max
A	5.23	5.40	5.61
A1	2.290	2.413	2.540
A2	1.91	2.00	2.16
b	1.07	1.20	1.33
b1	1.87	2.00	2.13
b2	1.07	1.25	1.40
b3	1.87	2.05	2.20
c	0.55	0.60	0.68
D	23.30	23.50	23.60
D1	17.90	18.10	18.30
D2	3.68	4.23	5.10
D3	2.40	2.50	2.60
D4	4.35	4.50	4.65
D5	8.915	9.115	9.315
D6	2.70	2.90	3.10
D7	7.85	8.00	8.15
D8	4.85	5.00	5.15
E	45.80	46.00	46.20
E1	46.30	46.40	46.50
E2	1.65	1.80	1.95
E3	3.85	4.00	4.15
E4	1.20	1.40	1.60
E5	5.80	6.00	6.20
E6	3.85	4.00	4.15
E7	5.85	6.00	6.15
e	2.54BSC		
e1	5.08BSC		
e2	10.16BSC		
L	16.30	16.50	16.70
ØP	3.51	3.60	3.65
ØP1	7.03	7.20	7.33
θ1	6°	9°	13°
θ2	16°	20°	24°
θ3	6°	9°	13°

Note:
1.All Dimension Are In mm,Angles Are In Degrees.
2.Package Body Sizes Exclude Mold Flash,Protrusion Or Gate Burrs.
Mold Flash Or Protrusion Shall Not Exceed 0.10mm Per Side.
Gate Burrs Shall Not Exceed 0.20mm Per Side.
3.Package Body Sizes Determined At The Outermost Extremes
Of The Plastic Body Exclusive Of Mold Flash,
Gate Burrs And Interlead Flash,
But Including Any Mismatch Between
The Top And Bottom Of The Plastic Body.

Ordering Information

Part Number	Marking	Package	Packaging Mode
GPT080M0120HBMXT1	GPT080M0120HBMXT1	TO-247-9L	10pcs /Tube

Notes

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- The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics.

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