

Features

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

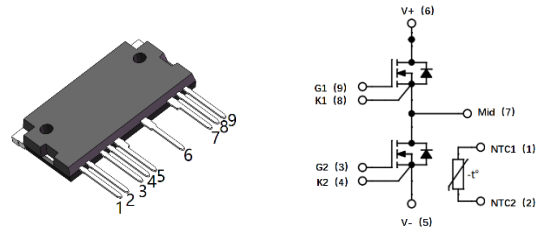
V_{DS}	1200V
I_b ($T_c = 25^\circ C$)	73A
$R_{DS(on)}$	40m Ω

Benefits

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

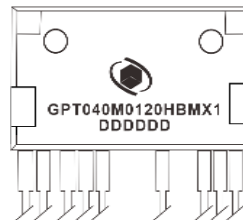
Applications

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



TO-247-9L

Inner Circuit



GPT = GPT
 040 = $R_{DS(on)}$ 40m Ω
 M = SiC MOSFET
 0120 = Voltage Rating
 1200V
 HBMX1 = Half-bridge
 power module
 DDDDDD = Traceable
 code



Maximum Ratings (at $T_j = 25^\circ\text{C}$, 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 $V_{GS} = 18\text{V}$, $T_c = 25^\circ\text{C}$ $V_{GS} = 18\text{V}$, $T_c = 100^\circ\text{C}$	I_D	73 54	A
Pulsed Drain Current Pulse width t_p limited by T_{jmax} , $V_{GS} = 18\text{V}$	$I_{D,pulse}$	140	A
Power Dissipation $T_c = 25^\circ\text{C}$ $T_c = 110^\circ\text{C}$	P_{tot}	357 154	W
Operating Junction Range	T_j	-55 to +175	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$
Soldering Temperature 1.6mm (0.063") from case for 10s	T_L	260	$^\circ\text{C}$
Mounting Torque, M3 Screw	M	1	Nm

Insulation Properties

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

Thermal Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Thermal Resistance, junction-case	$R_{th(j-c)}$		-	0.42	-	$^{\circ}\text{C}/\text{W}$

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

Static Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{V}, I_D = 100\mu\text{A}$	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1200\text{V}, V_{GS} = 0\text{V}$ $T_J = 25^{\circ}\text{C}$	-	0.08	100	μA
		$T_J = 175^{\circ}\text{C}$	-	11.09	-	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = 22\text{V}, V_{DS} = 0\text{V}$	-	-	100	nA
		$V_{GS} = -10\text{V}, V_{DS} = 0\text{V}$	-	-	100	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 10\text{mA}$ $T_J = 25^{\circ}\text{C}$	2	3.14	5	V
		$T_J = 175^{\circ}\text{C}$	-	2.13	-	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 18\text{V}, I_D = 35\text{A}$ $T_J = 25^{\circ}\text{C}$	-	39	60	m Ω
		$T_J = 175^{\circ}\text{C}$	-	58	-	
Transconductance	g_{fs}	$I_D = 30\text{A}$ $T_J = 25^{\circ}\text{C}$	-	13.2	-	S
		$T_J = 175^{\circ}\text{C}$	-	13.9	-	
Internal Gate Resistance	$R_{G(int)}$	$f = 1\text{MHz}, V_{AC} = 25\text{mV}$	-	1.35	-	Ω

Dynamic Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Input Capacitance	C_{iss}	$V_{DS} = 800V, V_{GS} = 0V$ $f = 1MHz, V_{AC} = 25mV$	-	3726	-	pF
Output Capacitance	C_{oss}		-	214	-	
Reverse Transfer Capacitance	C_{rss}		-	19	-	
C_{oss} Stroed Energy	E_{oss}		-	140	-	μJ
Total Gate Charge	Q_G	$V_{DD} = 800V, I_D = 30A$ $V_{GS} = -3/18V, \text{turn-on pulse}$	-	227	-	nC
Gate to Source Charge	Q_{GS}		-	40	-	
Gate to Drain Charge	Q_{GD}		-	80	-	

Switching Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 800V, I_D = 30A$ $V_{GS} = -3/18V, R_{G(ext)} = 4.7\Omega$ $L_\sigma = 100\mu H$	-	26.5	-	ns
Rise time	t_r		-	42.2	-	
Turn-off delay time	$t_{d(off)}$		-	43.7	-	
Fall Time	t_f		-	13.7	-	
Turn-on Switching Energy	E_{on}	Body diode at $V_{GS} = -3V$ Inductive load	-	644.7	-	μJ
Turn-off Switching Energy	E_{off}		-	191.2	-	
Total Switching Energy	E_{tot}		-	835.8	-	

Body Diode Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_{SD} = 20A,$ $T_J = 25^{\circ}C$ $T_J = 175^{\circ}C$	- -	3.57 3.27	- -	V
Continuous Diode Forward Current	I_{SD}	$V_{GS} = -3V, T_C = 25^{\circ}C$ $V_{GS} = -3V, T_C = 100^{\circ}C$	- -	- -	72 41	A
Revers Recovery Time	t_{rr}	$V_{DD} = 800V, I_D = 30A$ $V_{GS} = -3V, di/dt = 1000A/us$ $T_J = 25^{\circ}C$	-	24.2	-	ns
Revers Recovery Charge	Q_{rr}		-	144	-	nC
Peak Revers Recovery Current	I_{rm}		-	9.26	-	A

Thermistor

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Resistor	R_{25}	$T = 25 \pm 0.01^{\circ}C$	-	5	-	K Ω
Deviation of R_{100}	$\Delta R/R$	$T = 100^{\circ}C, R_{100} = 493\Omega$	-5	-	5	%
Maximum Power Rating	P_r	$T = 25 \pm 0.5^{\circ}C$	-	-	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

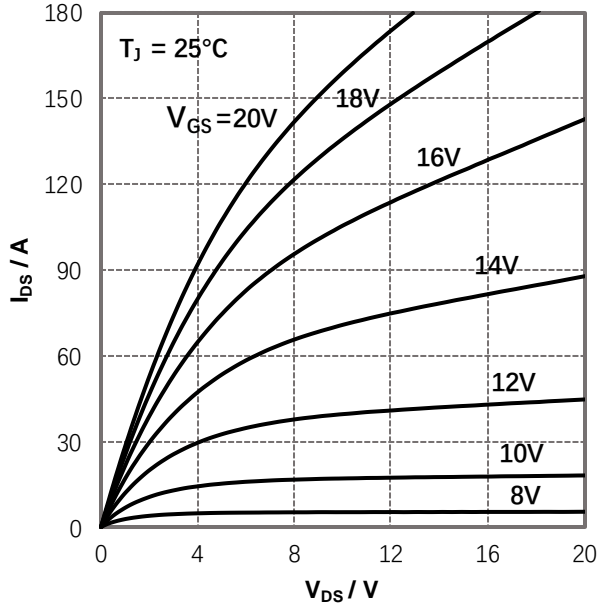


Figure 1. Output Characteristics $T_J=25^{\circ}\text{C}$

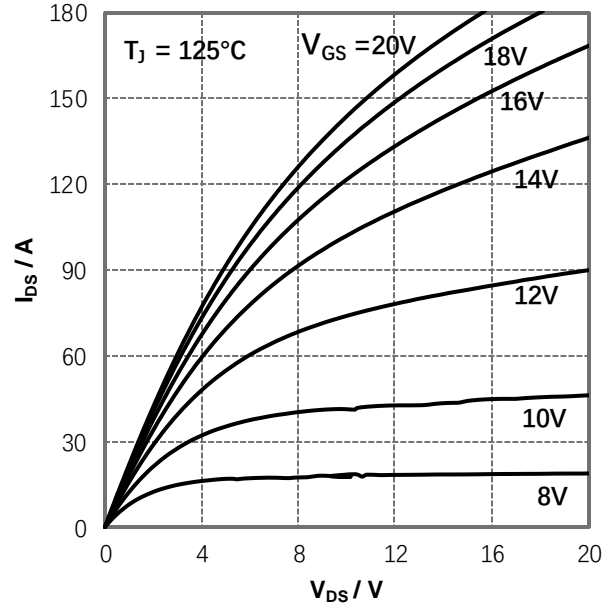


Figure 2. Output Characteristics $T_J=125^{\circ}\text{C}$

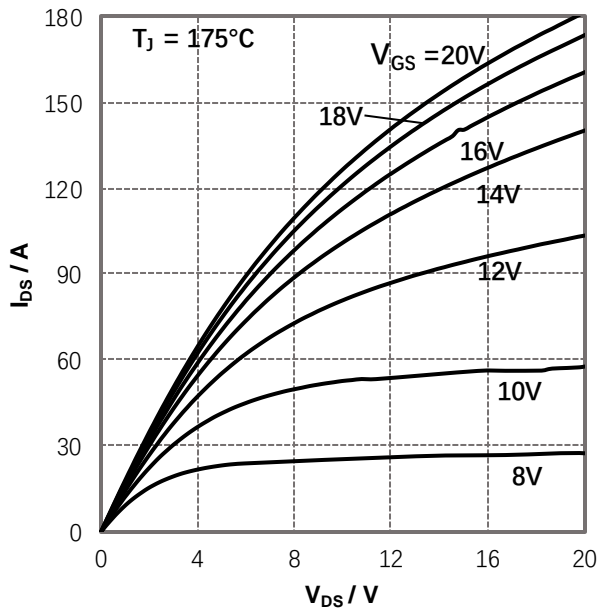


Figure 3. Output Characteristics $T_J=175^{\circ}\text{C}$

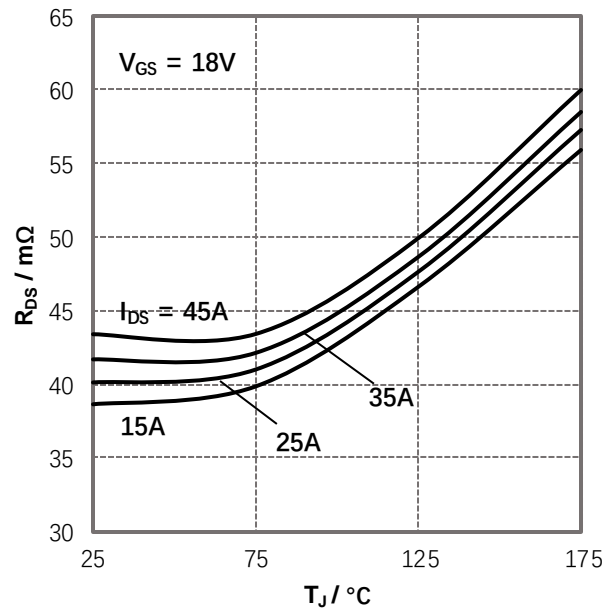


Figure 4. On-Resistance vs. Temperature For Various Drain Current



Typical Characteristics Curves

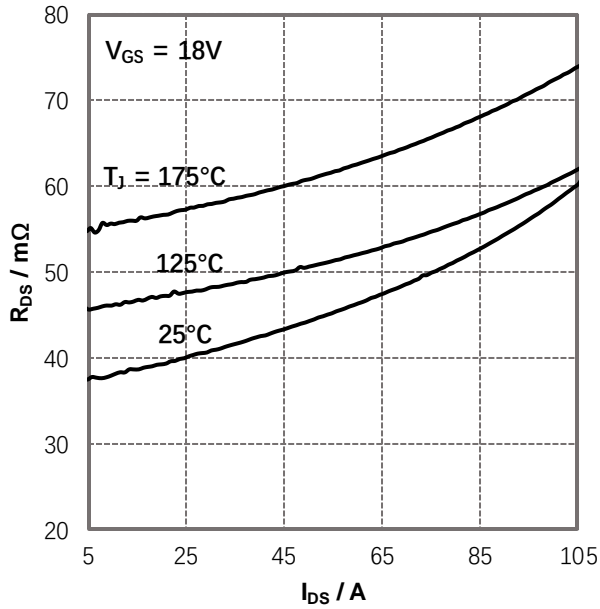


Figure 5. On-Resistance vs. Drain Current For Various Temperature

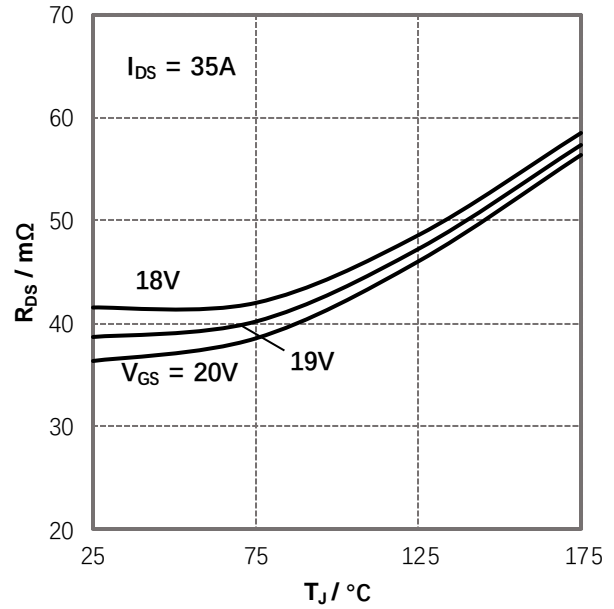


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

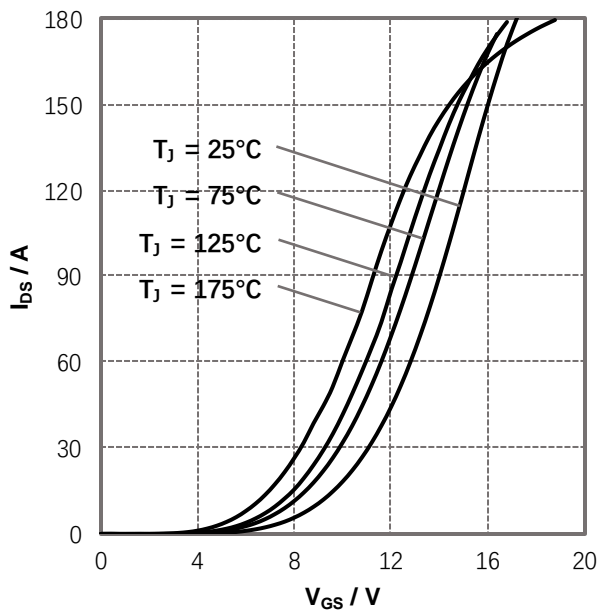


Figure 7. Transfer Characteristics

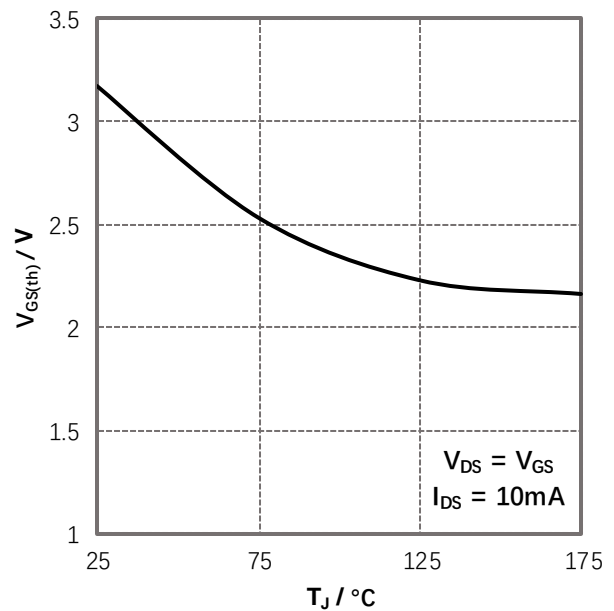


Figure 8. Threshold Voltage vs. Temperature

Typical Characteristics Curves

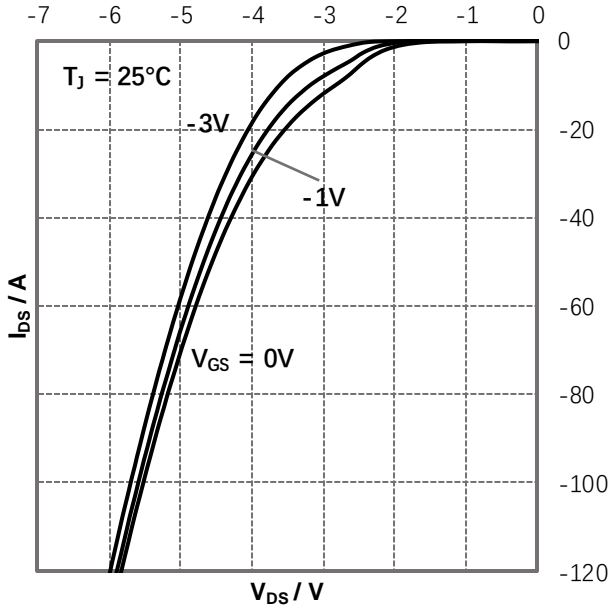


Figure 9. Body Diode Characteristics $T_J=25^{\circ}\text{C}$

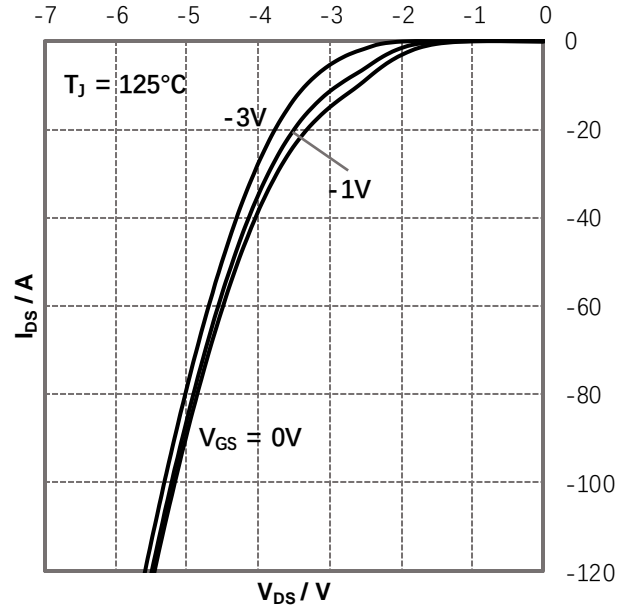


Figure 10. Body Diode Characteristics $T_J=125^{\circ}\text{C}$

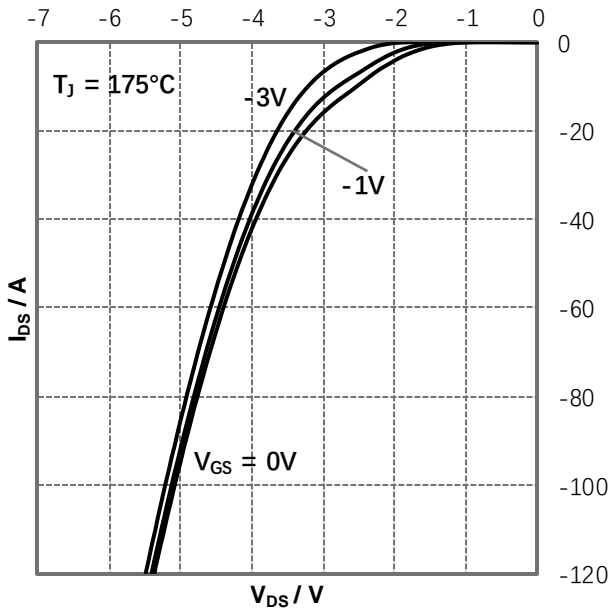


Figure 11. Body Diode Characteristics $T_J=175^{\circ}\text{C}$

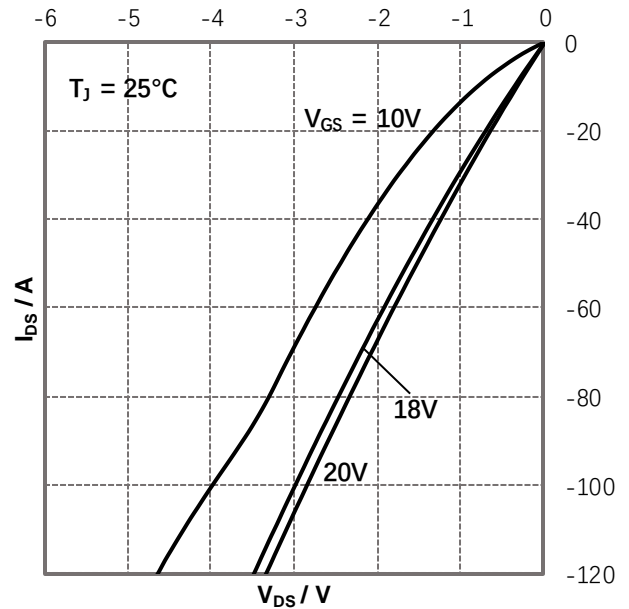


Figure 12. 3rd Quadrant Characteristics $T_J=25^{\circ}\text{C}$

Typical Characteristics Curves

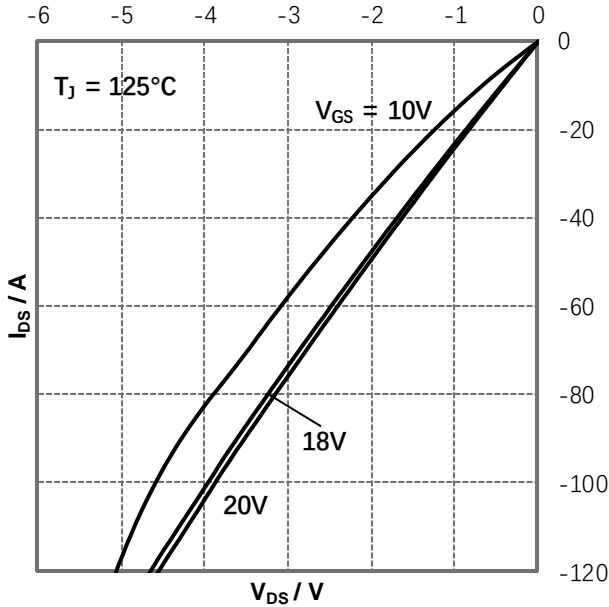


Figure 13. 3rd Quadrant Characteristics $T_J = -125^{\circ}\text{C}$

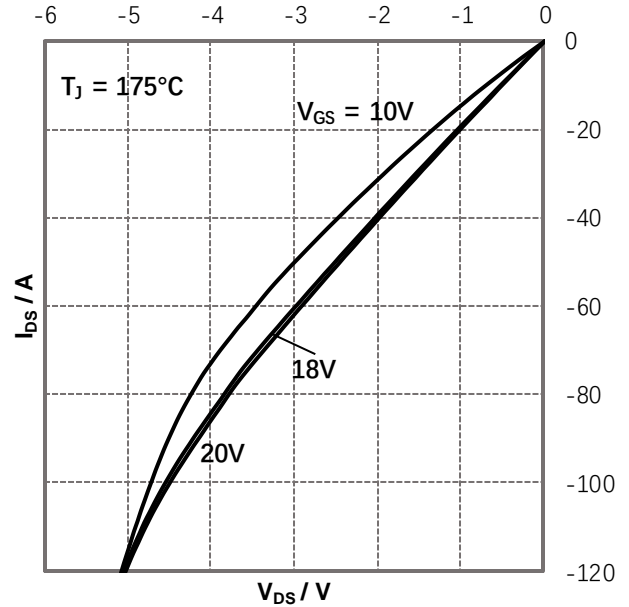


Figure 14. 3rd Quadrant Characteristics $T_J = -175^{\circ}\text{C}$

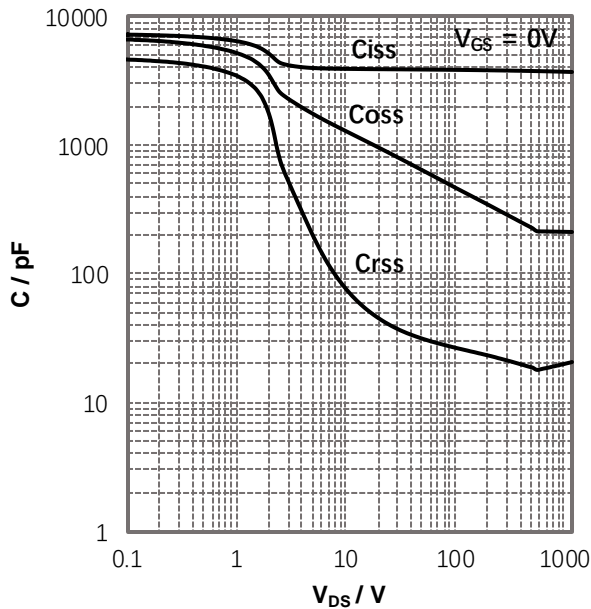


Figure 15. Capacitances vs. Drain-Source Voltage

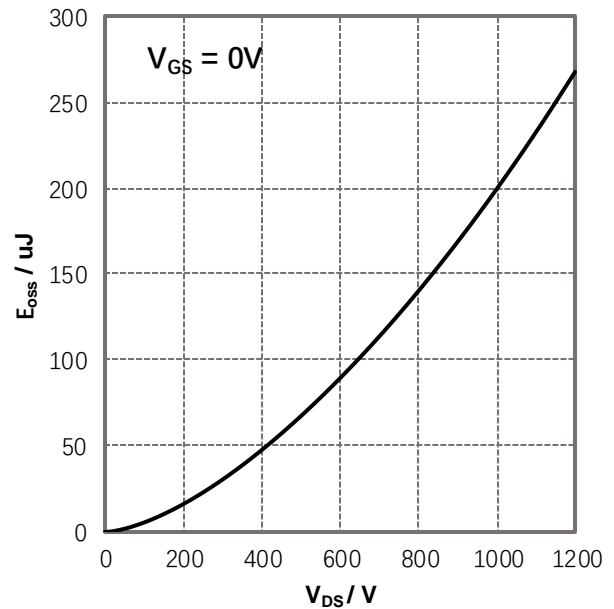


Figure 16. Output Capacitor Stored Energy

Typical Characteristics Curves

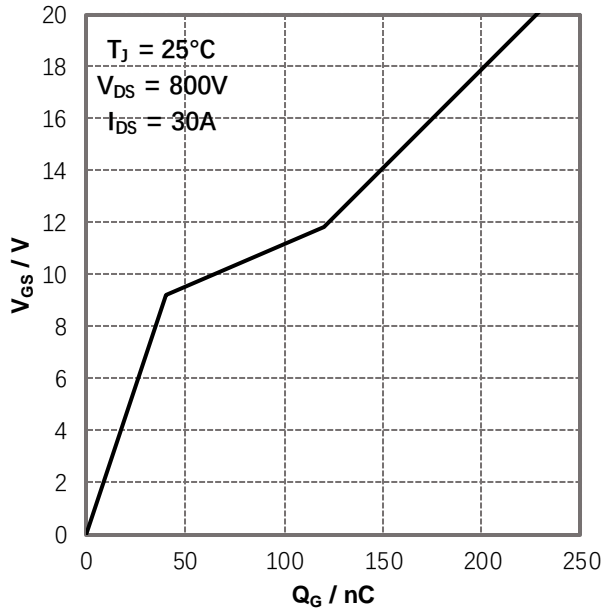


Figure 17. Gate Charge Characteristics

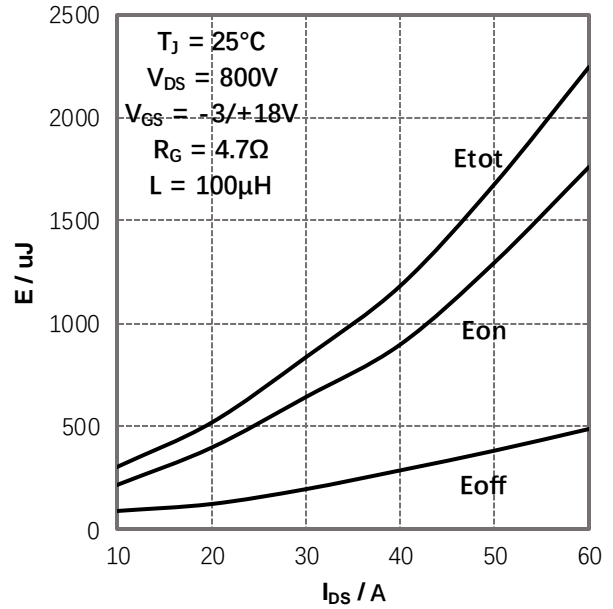


Figure 18. Switching Energy vs. Drain Current

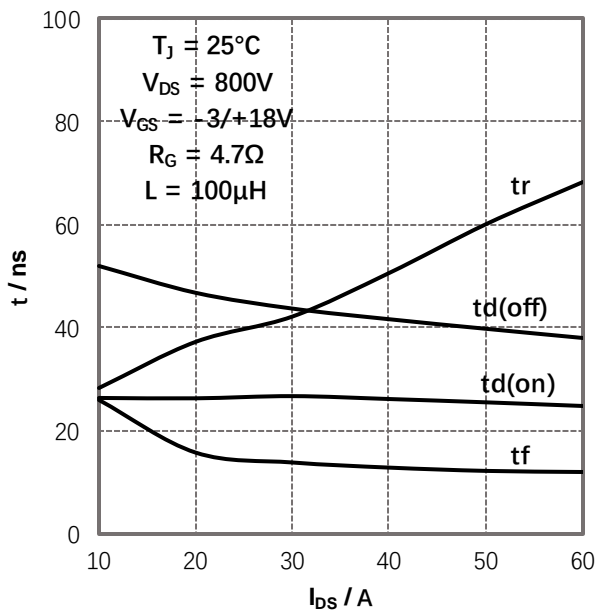


Figure 19. Switching Time vs. Drain Current

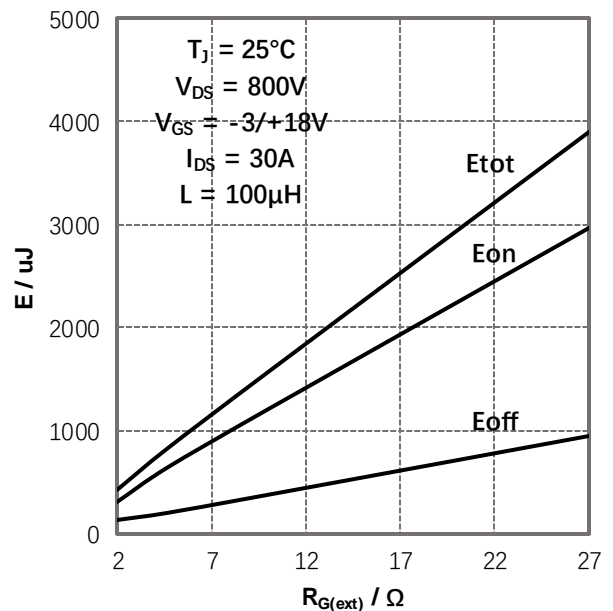


Figure 20. Switching Energy vs. $R_{G(ext)}$



Typical Characteristics Curves

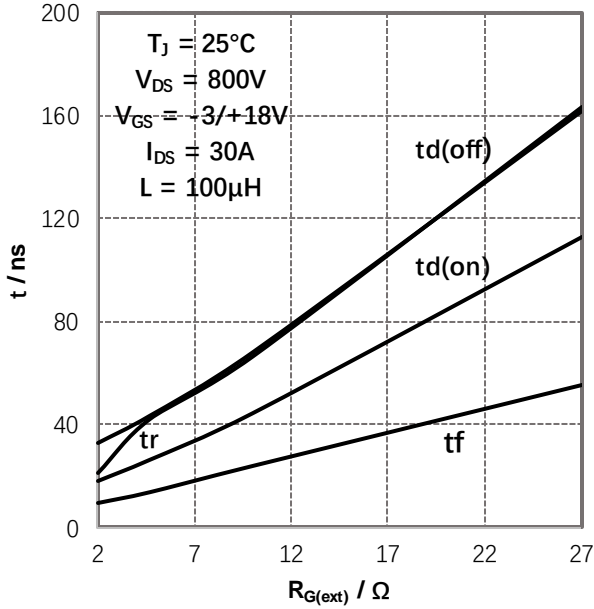


Figure 21. Switching Time vs. $R_{G(ext)}$

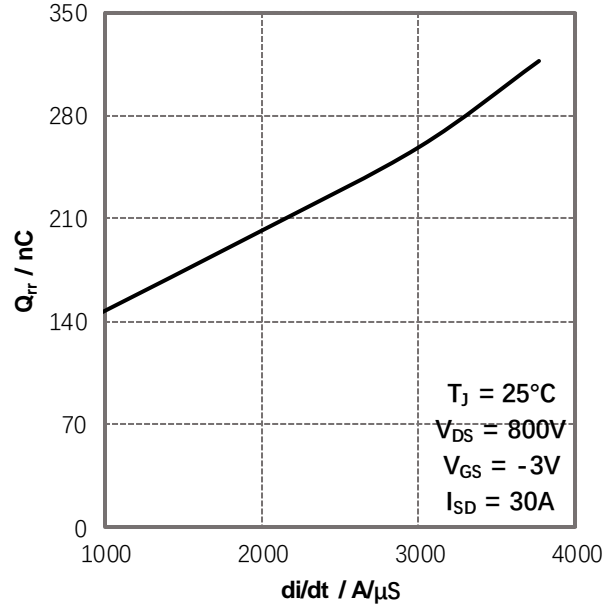


Figure 22. Reverse Recovery Charge vs. di/dt

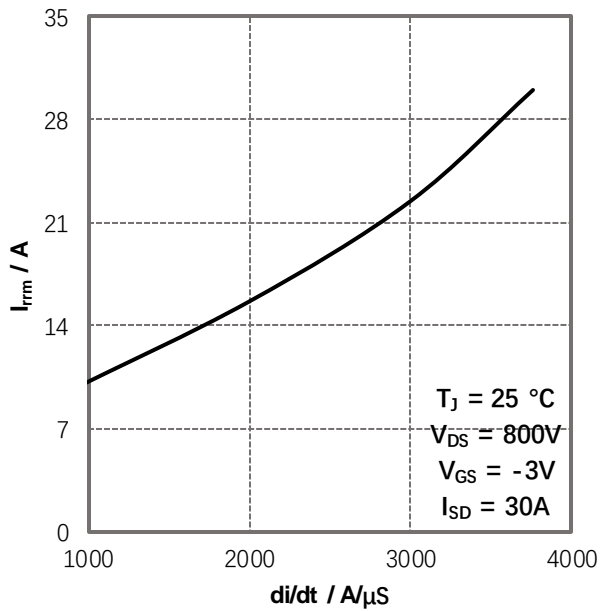


Figure 23. Reverse Recovery Current vs. di/dt

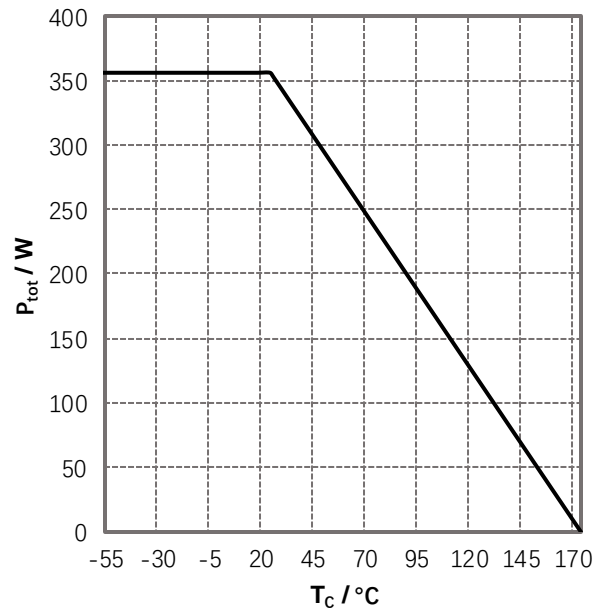


Figure 24. Power Dissipation Derating

Typical Characteristics Curves

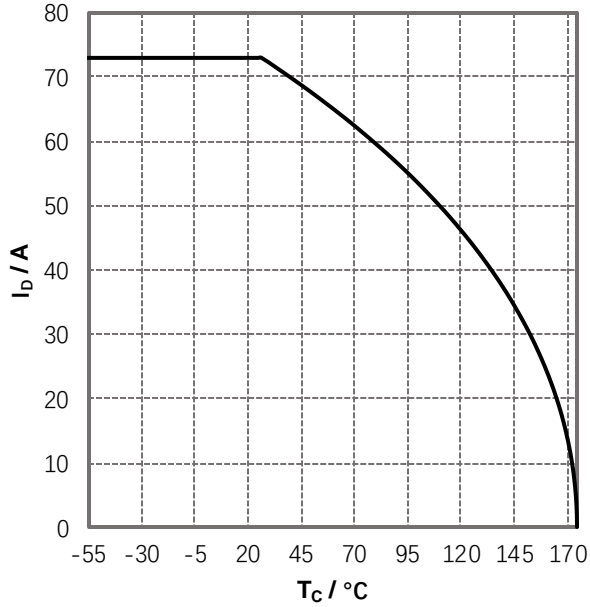


Figure 25. Continuous Drain Current Derating

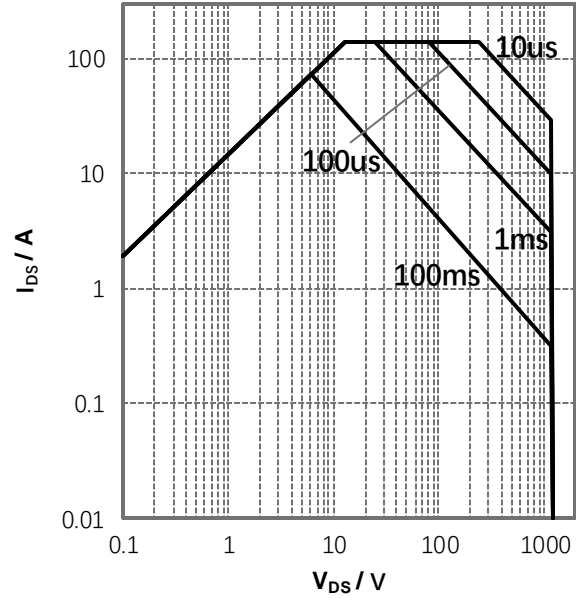


Figure 26. Safe Operating Area

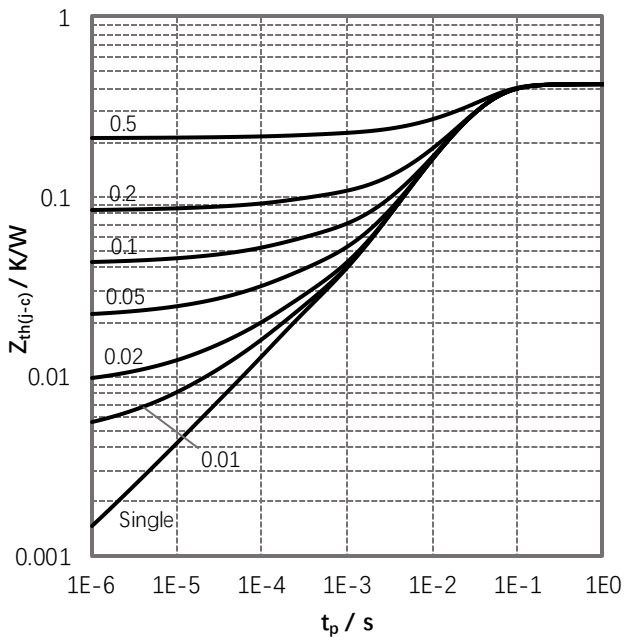


Figure 27. Transient Thermal Impedance (Junction-Case)

Notes

- Global Power Technology reserves the right to change or modify any of the products and their inherent physical and technical specifications without prior notice. Global Power Technology assumes no responsibility or liability for any errors or inaccuracies within.
- The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics.

Related Links

- Global Power Technology Website: <http://www.globalpowertech.cn/>
- GPT online store is now open! you can place an order directly online, buy it easily, and send it directly from the factory! For more detailed product, price information and coupon activities, please log in to GPT online store: <http://sc.globalpowertech.cn/>

