Product Summary

V_{DS} = 1200 V
I_D@25ºC = 69A
$R_{DS(ON)}$ = 33mΩ
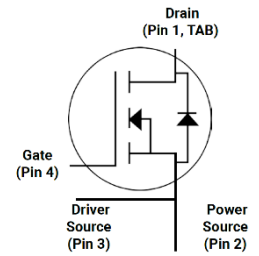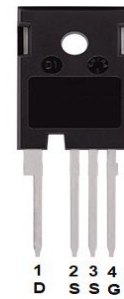
TO-247-4

Features

- High Blocking Voltage
- High Frequency Operation
- Low on-resistance
- Fast intrinsic diode with low reverse recovery
- 100% avalanche tested

Benefits

- Higher System Efficiency
- Parallel Device Convenience without thermal runaway
- High Temperature Application
- Hard Switching & Higher Reliability
- Easy to drive

Applications

- Motor Drives
- Solar / Wind Inverters
- EV Charging Station

- AC/DC converters
- DC/DC converters
- Uninterruptable power supplies

Maximum Ratings (T_C=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Value	Unit
Drain - Source Voltage	V_{DSmax}	V_{GS}=0V, I_D=100µA	1200	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC (f>1 Hz)	-10 / +25	V
Gate - Source Voltage (static)	V_{GSop}	static	-5 / +20	V
Continuous Drain Current	I_D	V_{GS} = 20V, T_C=25°C V_{GS} = 20V, T_C=100°C	69 49	A
Pulsed Drain Current	$I_{D(pulse)}$	T_C=25°C	114	A
Total power dissipation	P_D	T_C=25°C	300	W
Avalanche Capability	E_{AS}	V_{DD} = 100V, V_{GS}=20V, L=2mH	576	mJ
Avalanche Capability	I_{AV}	V_{DD} = 100V, V_{GS}=20V, L=2mH	24	A
Operating Junction Temperature	T_J		-55 to 175	°C
Storage Temperature	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.

Revision 2.0

Electrical Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 100µA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 10mA	1.8	2.6	3.7	V
		V_{DS} = V_{GS}, I_D = 10mA, T_J = 150°C		1.9		
		V_{DS} = V_{GS}, I_D = 10mA, T_J = 175°C		1.8		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V	0	1	50	µA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 20V, V_{DS} = 0V	0	1	200	nA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = -5V, V_{DS} = 0V	-200	-1	0	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 20V, I_D = 40 A		33	45	mΩ
		V_{GS} = 20V, I_D = 40 A, T_J = 150°C		50		
		V_{GS} = 20V, I_D = 40 A, T_J = 175°C		56		
		V_{GS} = 18V, I_D = 40 A,		37		
Transconductance	g_{fs}	V_{DS} = 20V, I_D = 40 A,		24		S
		V_{DS} = 20V, I_D = 40 A, T_J = 150°C		22		
		V_{DS} = 20V, I_D = 40 A, T_J = 175°C		22		
Input capacitance	C_{iss}	V_{DS} = 1000V, V_{GS} = 0V f = 1MHz		2660		pF
Output capacitance	C_{oss}			128		
Reverse transfer capacitance	C_{rss}			9		
C_{oss} Stored Energy	E_{oss}			84		µJ
Total gate charge	Q_g	V_{DS} = 800V, V_{GS} = -5V / 20V I_D = 40 A,		136		nC
Gate-source charge	Q_{gs}			36		
Gate-drain charge	Q_{gd}			62		
Internal gate input resistance	$R_{g(int)}$	f = 1MHz, I_D = 0A		2.4		Ω
Turn-On Switching Energy	E_{ON}	V_{DS} = 800 V, V_{GS} = -5V/20V, I_D = 40A, $R_{G(ext)}$ =2Ω, L=200µH		145		µJ
Turn-Off Switching Energy	E_{OFF}			75		
Turn-On Delay Time	$t_{d(on)}$			12		ns
Rise Time	t_r			13		
Turn-Off Delay Time	$t_{d(off)}$			29		
Fall Time	t_f			8		

Reverse Diode Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_{SD}	V_{GS} = -5V, I_{SD} = 20A,		4.6		V
		V_{GS} = -5V, I_{SD} = 20A, T_J = 150°C		4.1		
		V_{GS} = -5V, I_{SD} = 20A, T_J = 175°C		4.0		
Continuous Diode Forward Current	I_S	V_{GS} = -5V			55	A
Reverse Recovery time	t_{rr}	V_{GS} = -5V, I_{SD} = 40A, V_R= 800V, dif/dt = 4600 A/μs		27		ns
Reverse Recovery Charge	Q_{rr}			790		nC
Peak Reverse Recovery Current	I_{rrm}			50		A

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal Resistance (per device)	$R_{th(j-c)}$	junction-case		0.4	0.5	^{0}C/W

Typical Performance
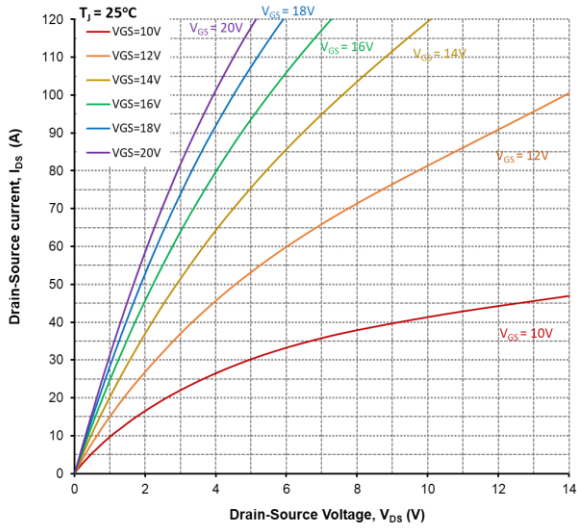
Figure 1. Output Characteristics, $T_J = 25^oC$
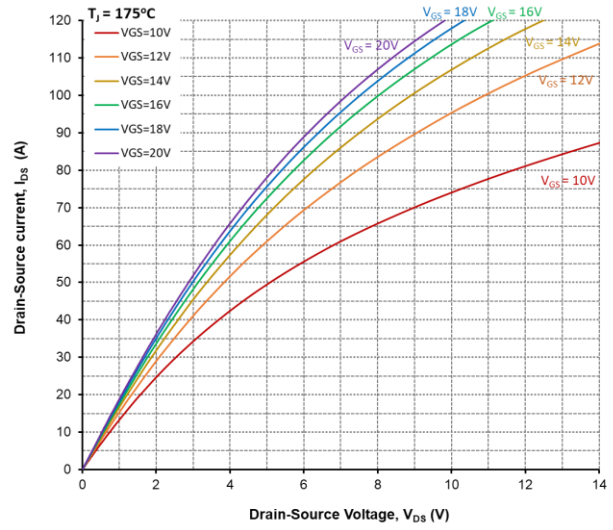
Figure 2. Output Characteristics, $T_J = 175^oC$
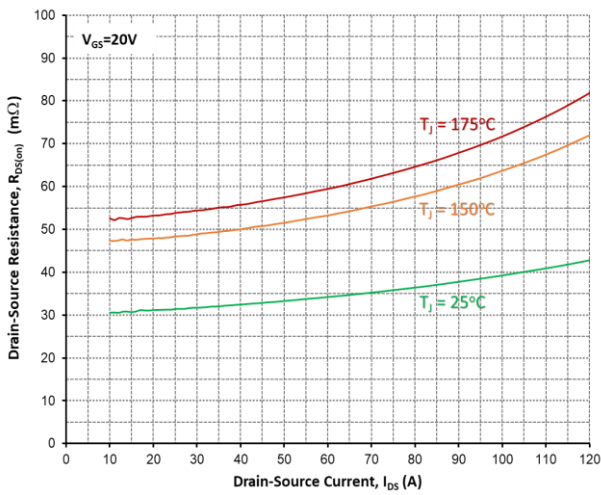
Figure 3. On-Resistance vs. Drain Current
For Various Temperatures
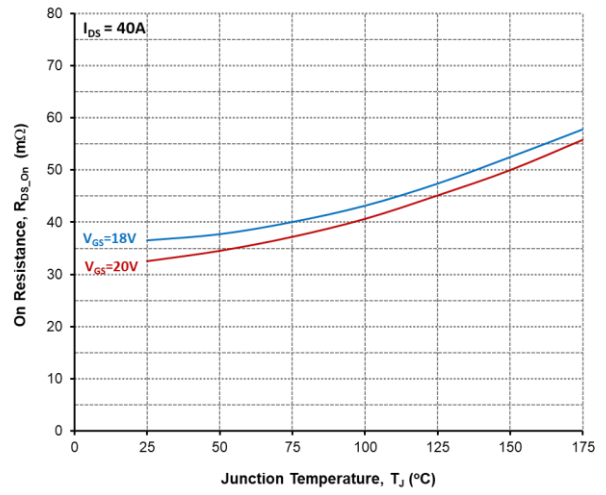
Figure 4. On-Resistance vs. Temperature
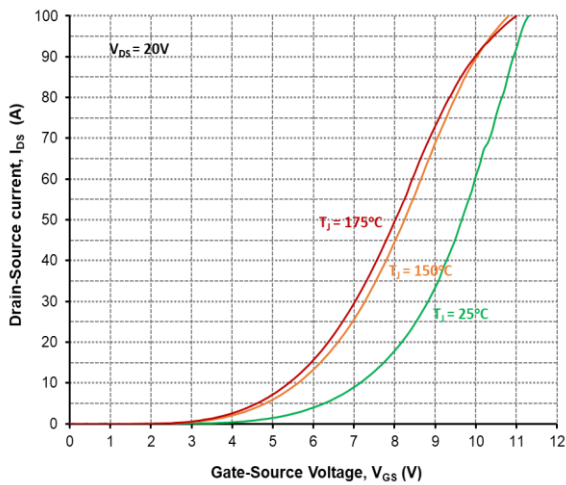
Figure 5. Transfer Characteristic For Various Junction
Temperatures
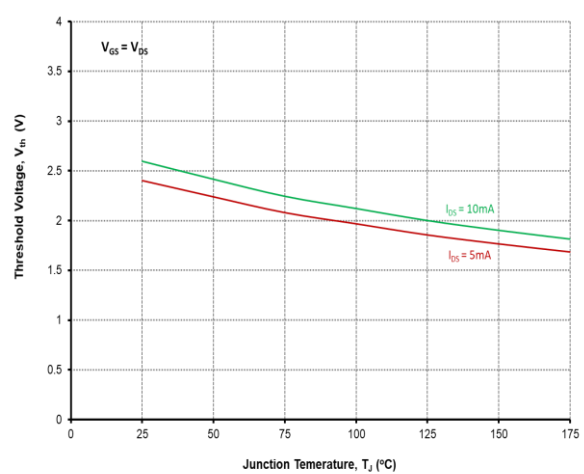
Figure 6. Threshold Voltage vs. Temperature

Revision 2.0
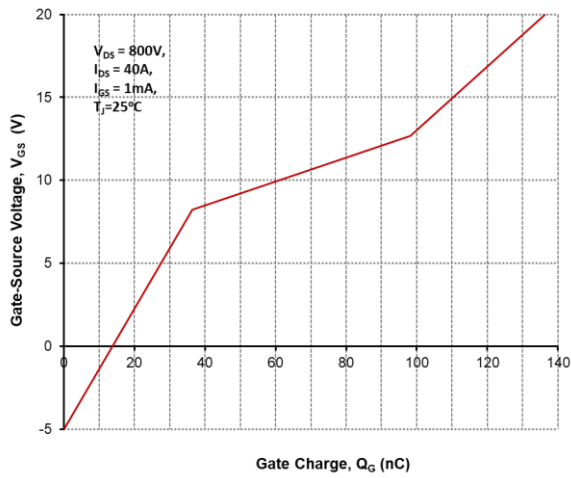
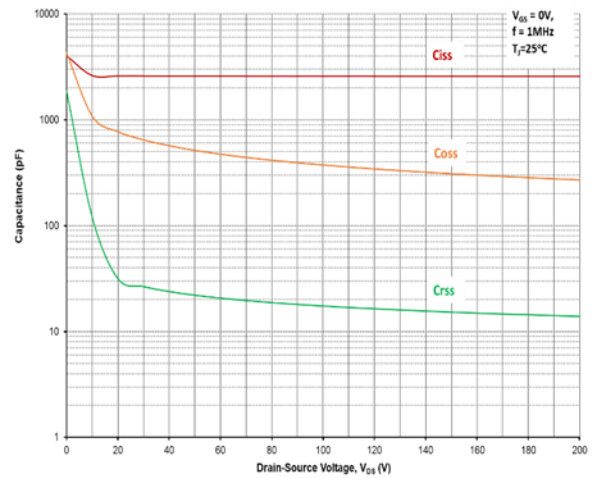## Typical Performance

Figure 7. Gate Charge Characteristics

Figure 8. Capacitances vs. Drain-Source Voltage (0-1200V)
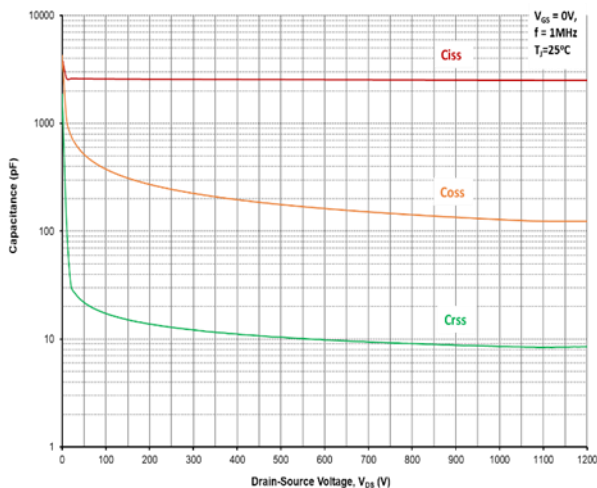
Figure 9. Capacitances vs. Drain-Source Voltage (0-200V)
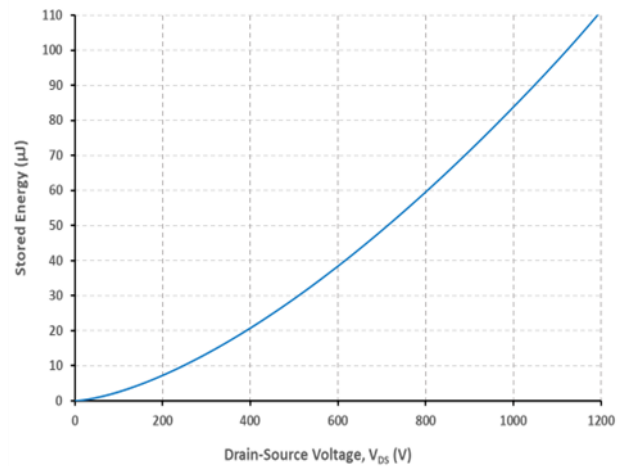
Figure 10. Output Capacitor Stored Energy
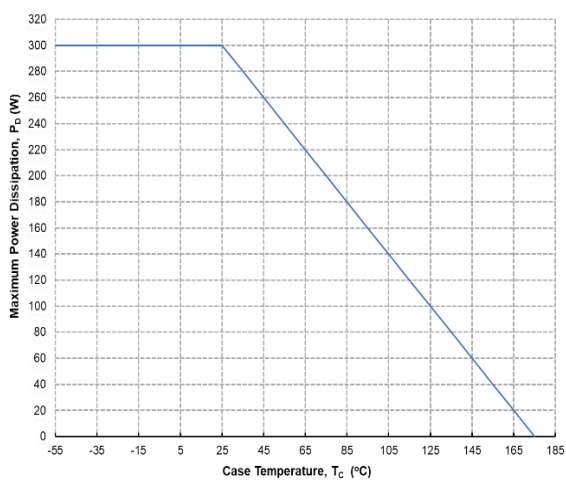
Figure 11. Maximum Power Dissipation Derating vs. Case Temperature
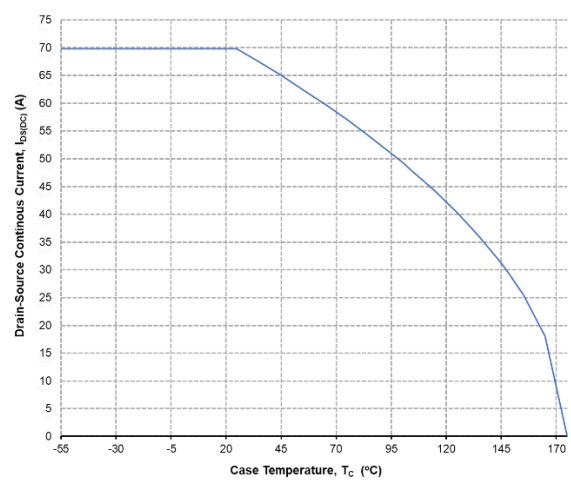
Figure 12. Continuous Drain Current Derating vs. Case Temperature
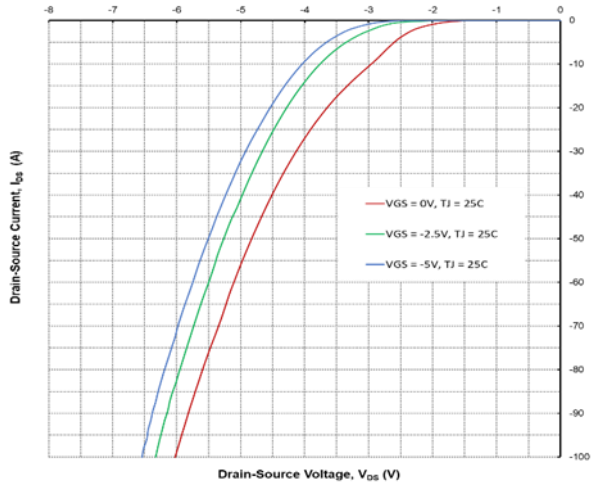
Typical Performance

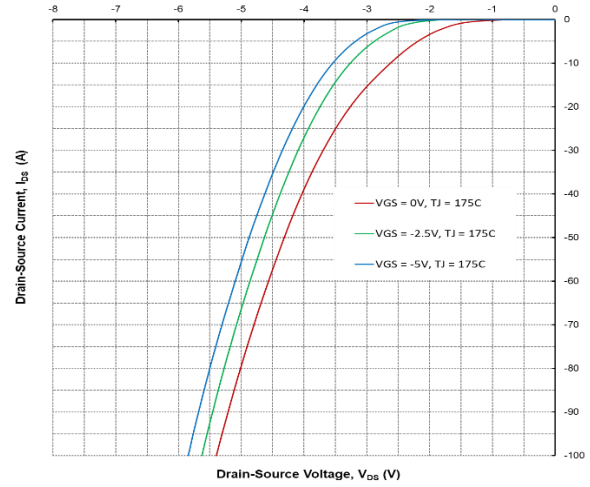Figure 13. Body Diode Characteristics @ 25°C
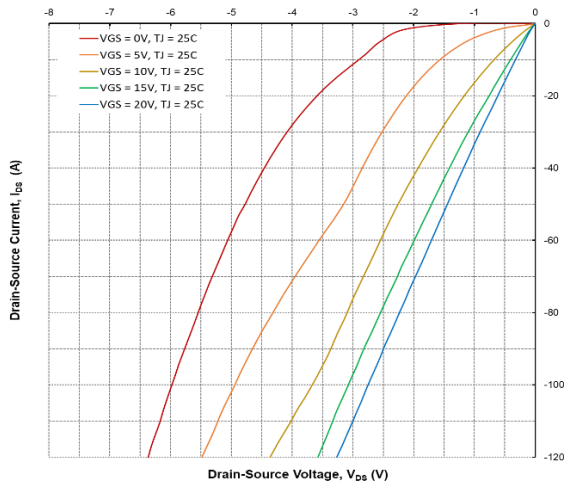

Figure 14. Body Diode Characteristics @ 175°C

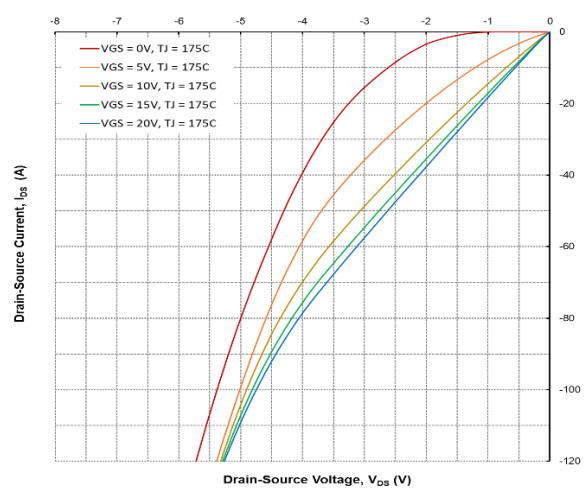Figure 15. 3rd Quadrant Characteristics @ 25°C

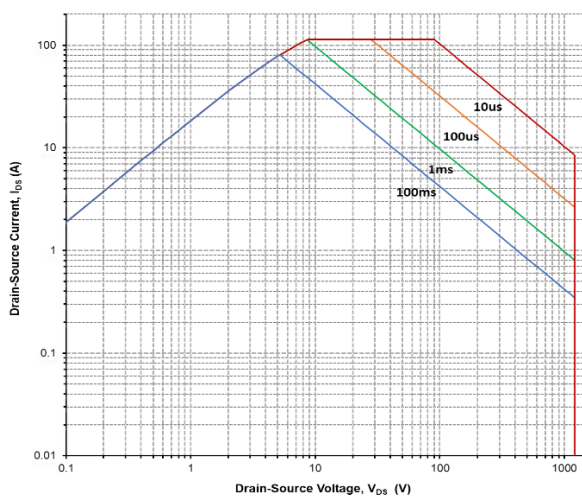Figure 16. 3rd Quadrant Characteristics @ 175°C

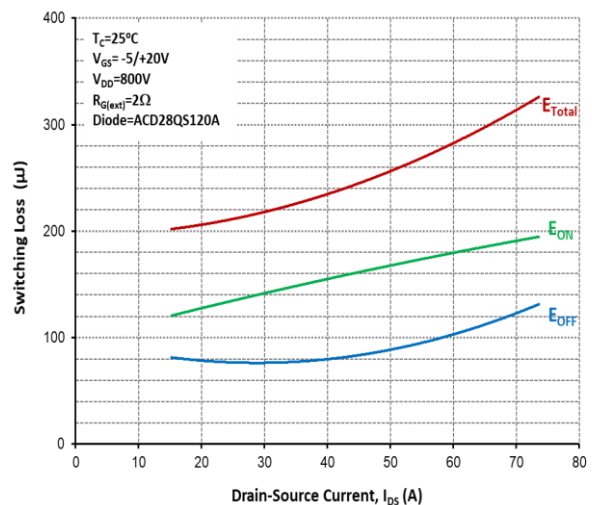Figure 17. Safe Operating Area

Figure 18. Switching energy vs Drain current
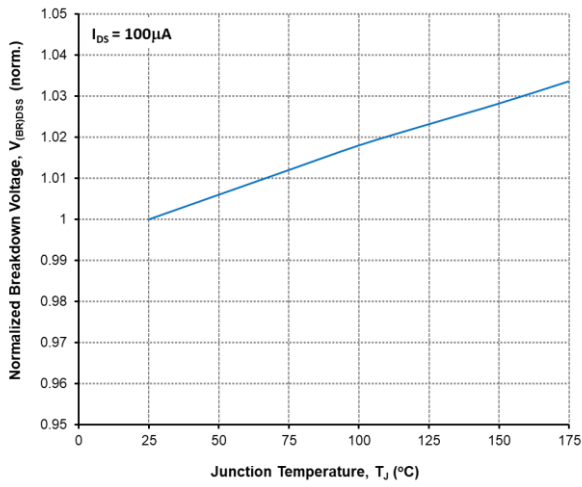
Typical Performance
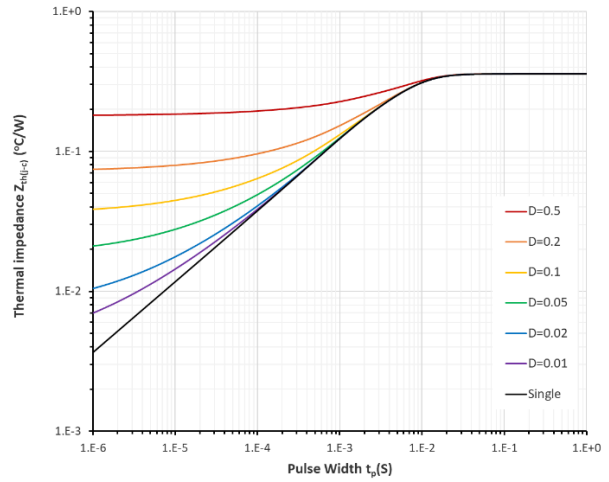

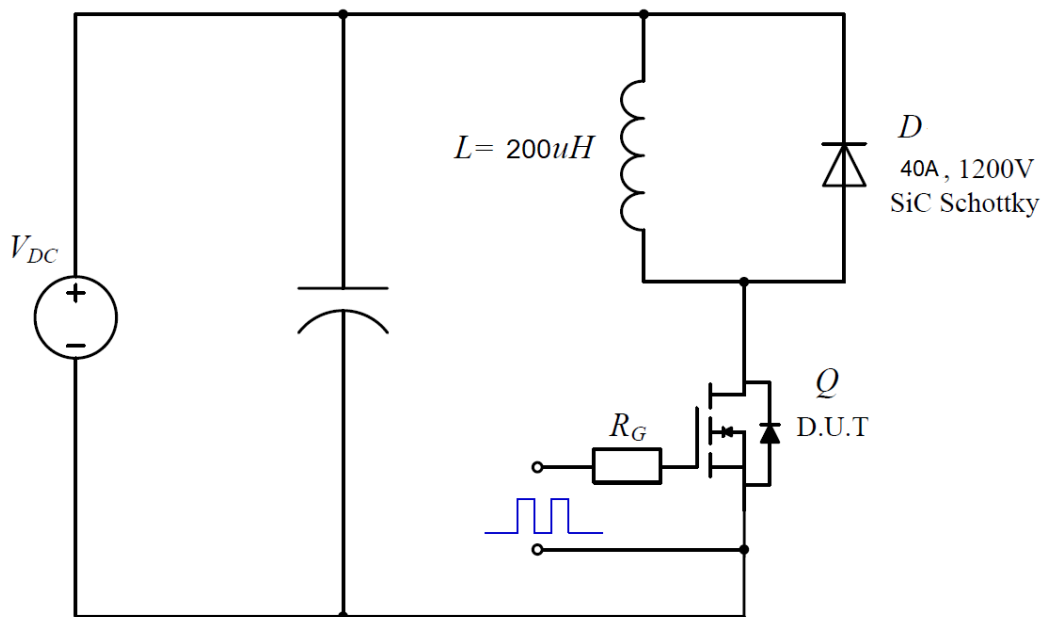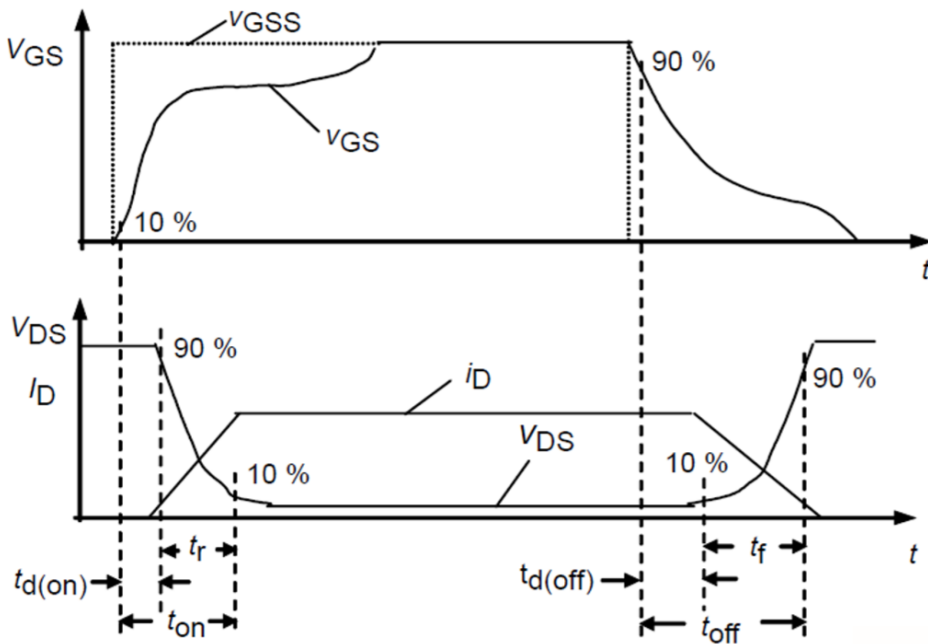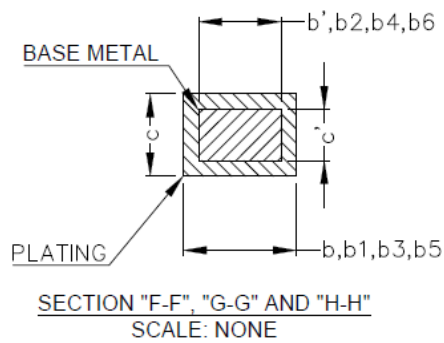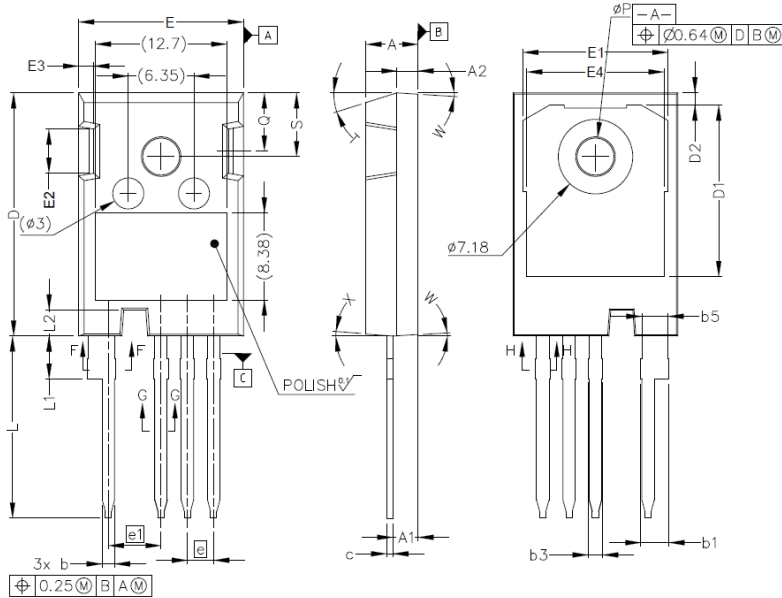Figure 19. Normalized breakdown voltage vs Temperature

Figure 20. Transient Thermal Impedance
(Junction to Case)

Switching Times Definition and Test Circuit

Package Dimensions

(TO-247-4 Package)

SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

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.	

NOTE ;
1. ALL METAL SURFACES: TIN PLATED,EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO
   ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS.
   ANGLES ARE IN DEGREES.