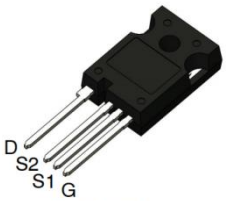
SiC MOSFET

Features

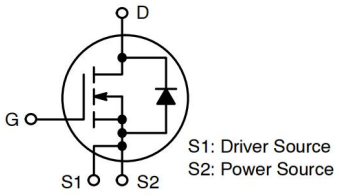
- Typ. $R_{DS(on)}$ = 16 mΩ @ V_{GS} = 18 V
- High Speed Switching with Low Capacitance (C_{RSS} = 8.5pF)
- 100% Avalanche Tested
- This Device is Halide Free and RoHS Compliant



TO-247-4L

Benefits

- Solar Inverters
- Electric Vehicle Charging Stations
- UPS (Uninterruptible Power Supplies)
- Energy Storage Systems
- SMPS (Switch Mode Power Supplies)
- Welding



N-CHANNEL MOSFET

Absolute Maxinmun Ratings

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	2300	V
Gate-to-Source Voltage			V_{GS}	-10/+22	V
Continuous Drain Current (Notes 1, 3)	Steady State	T_C = 25°C	I_D	200	A
Power Dissipation (Note 1)	Steady State	T_C = 25°C	P_D	960	W
Continuous Drain Current (Notes 1, 3)	Steady State	T_C = 100°C	I_D	120	A
Power Dissipation (Note 1)	Steady State	T_C = 100°C	P_D	480	W
Pulsed Drain Current (Note 2)	T_C = 25°C		I_{DM}	700	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	-55 to +175	°C
Source Current (Body Diode) T_C = 25°C, V_{GS} = -3 V (Note 1)			I_S	200	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)}$ = 90A, L = 1 mH) Note4)			E_{AS}	4000	mJ
Maximum Lead Temperature for Soldering (1/25" from case for 10 s)			T_L	270	°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.**

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Repetitive rating, limited by max junction temperature.
3. The maximum current rating is based on typical $R_{DS(on)}$ performance.
4. **EAS of 4000mJ is based on starting T_J = 25°C; L = 1 mH, I_{AS} = 90 A, V_{DD} = 100 V, V_{GS} = 18 V.**

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Junction-to-Case - Steady State	0.156	℃/W
$R_{th\ j\text{-}a}$	Junction-to-Ambient - Steady State	40	℃/W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF-STATE CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA	2300	_	_	V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}$ / T_J	I_D = 1 mA	_	0.39	_	V/℃
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V	_	_	100	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS} = +22/-10 V, V_{DS} = 0 V	_	_	±1	μA
ON-STATE CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}= V_{DS}, I_D = 45 mA, T_J = 25℃	2.0	3	4	V
		V_{GS}= V_{DS}, I_D = 45 mA, T_J = 175℃		2.2		
Drain-to-Source On Resistance	$R_{DS(on)}$	V_{GS} = 18 V, I_D = 60 A, T_J = 25℃	_	16	22	mΩ
		V_{GS} = 18 V, I_D = 60 A, T_J = 175℃	_	37	_	
		V_{GS} = 15 V, I_D = 60 A, T_J = 25℃	_	20	28	
		V_{GS} = 15 V, I_D = 60 A, T_J = 175℃	_	47	_	
Forward Trans-conductance	g_{FS}	V_{DS} = 10 V, I_D = 60 A	_	38	_	S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 1500V	_	4350	_	pF
Output Capacitance	C_{OSS}		_	166	_	
Reverse Transfer Capacitance	C_{RSS}		_	8.5	_	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = -3/18 V, V_{DS} = 1500V, I_D = 60 A	_	180	_	nC
Gate-to-Source Charge	Q_{GS}		_	53	_	
Gate-to-Drain Charge	Q_{GD}		_	56	_	
Gate-Resistance	R_G	f = 1 MHz	_	1.05	_	Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	V_{GS} = -3/18 V, V_{DS} = 1500 V, I_D = 60 A, R_G = 4.5 Ω Inductive load	_	20	_	ns
Rise Time	t_r		_	19	_	
Turn-Off Delay Time	$t_{d(OFF)}$		_	37	_	
Fall Time	t_f		_	8	_	
Turn-On Switching Loss	E_{ON}		_	1250	_	μJ
Turn-Off Switching Loss	E_{OFF}		_	266	_	
Total Switching Loss	E_{tot}		_	1516	_	

SOURCE-DRAIN DIODE CHARACTERISTICS

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified) (continued)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
SOURCE-DRAIN DIODE CHARACTERISTICS						
Continuous Source-Drain Diode Forward Current (Note 1)	I_{SD}	V_{GS} = -3 V, T_C = 25℃	-	-	200	A
Pulsed Source-Drain Diode Forward Current (Note 2)	I_{SDM}		-	-	700	
Forward Diode Voltage	V_{SD}	V_{GS} = -3 V, I_{SD} = 60 A, T_J = 25℃	-	4.6	-	V
Reverse Recovery Time	t_{RR}	V_{GS} = -3/18 V, I_{SD} = 60 A, dI_S/dt = 1000 A/μs, V_{DS} = 1500 V	-	32	-	ns
Reverse Recovery Charge	Q_{RR}		-	228	-	nC
Reverse Recovery Energy	E_{REC}		-	8	-	μJ
Peak Reverse Recovery Current	I_{RRM}		-	20	-	A
Charge Time	t_A		-	21	-	ns
Discharge Time	t_B		-	13	-	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

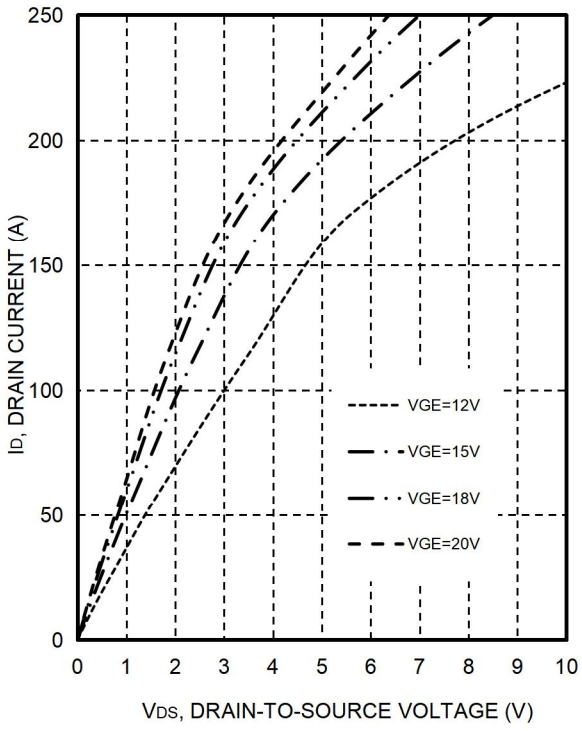


Figure 1.On-Region Characteristics（T_j=25℃）

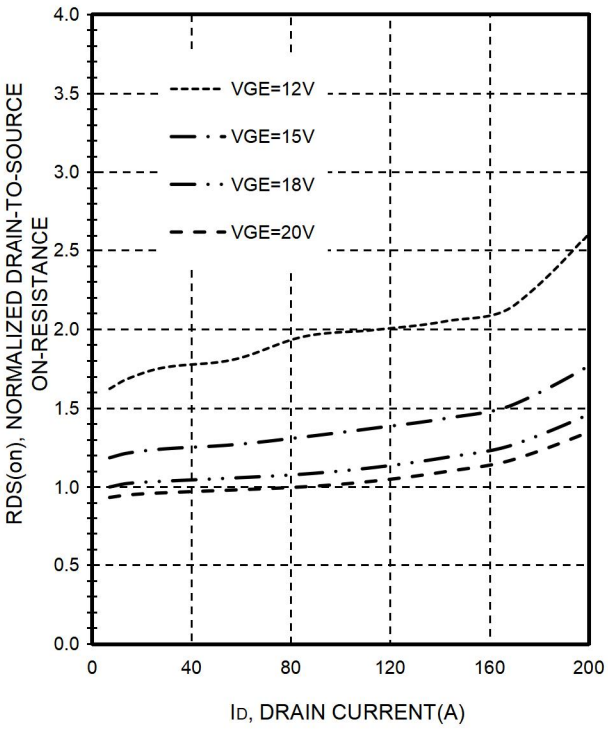


Figure 2.Normalized On-Resistance vs. Drain Current and Gate Voltage（T_j=25℃）

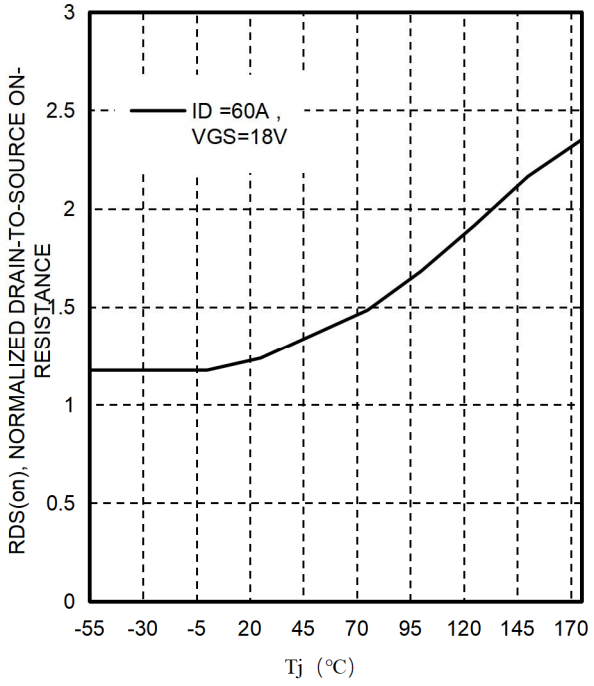


Figure 3.On-Resistance Variation with Temperature

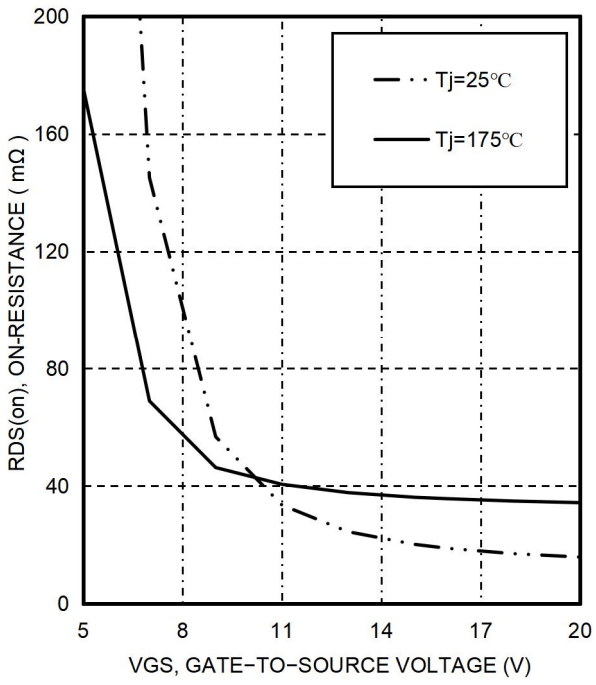


Figure 4.On-Resistance vs.Gate-to-Source Voltage

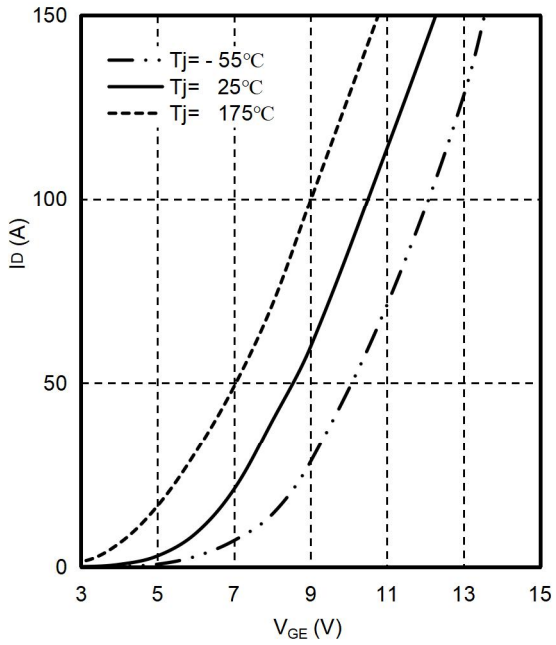


Fig 5. Transfer characteristic, V_{DS}=10V

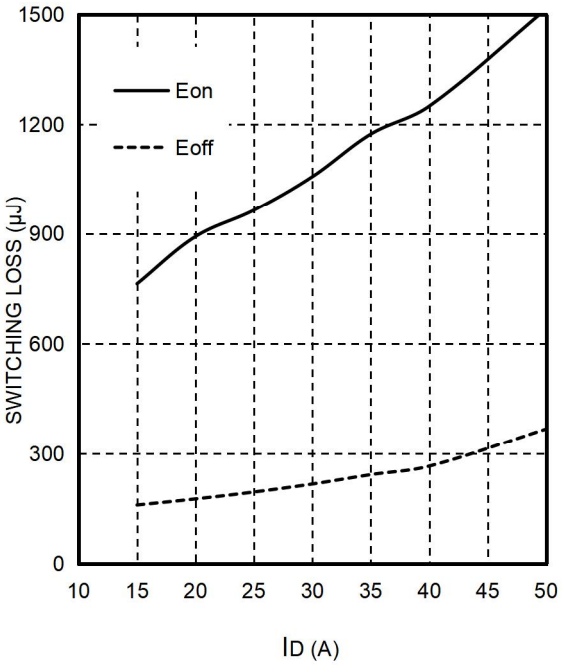


Figure 6. Switching Loss vs. Drain Current, Rg= 4.5Ω, V_{DD}=1500V, V_{GS}=18V/-3V

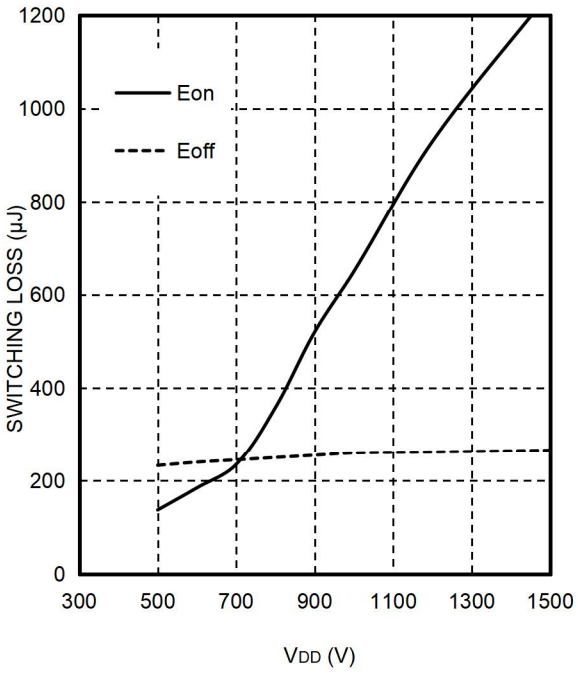


Figure 7. Switching Loss vs. Drain Voltage, R_g= 4.5Ω, I_D=60A, V_{GS}=18V/-3V

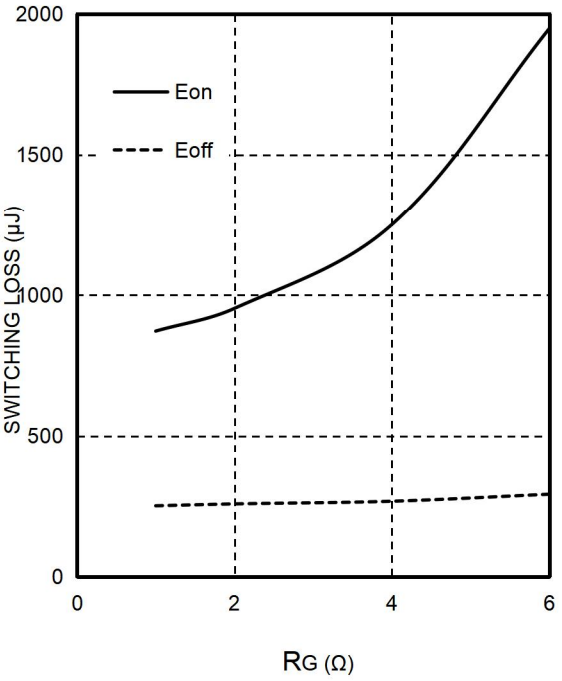


Figure 8. Switching Loss vs. Gate Resistance, I_D= 60A, V_{DD}=1500V, V_{GS}=18V/-3V

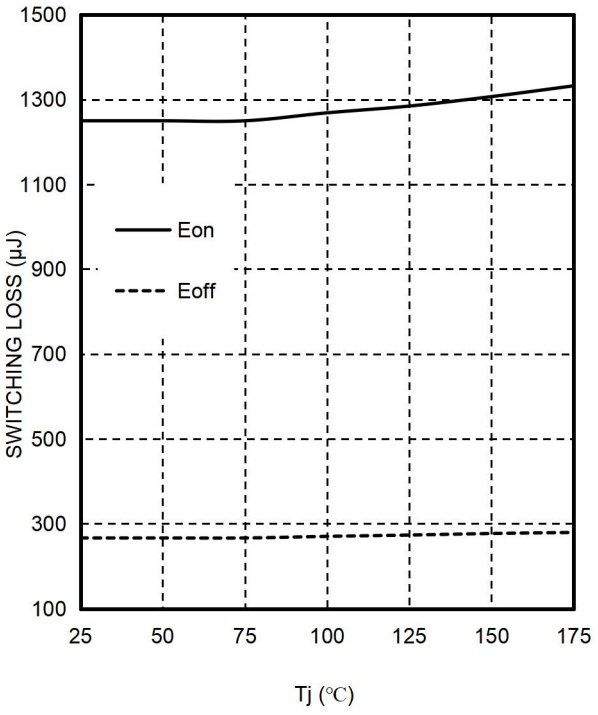


Figure 9. Switching Loss vs. Temperature, I_D= 60A, V_{DD}=1500V, V_{GS}=18V/-3V,R_g=4.5Ω

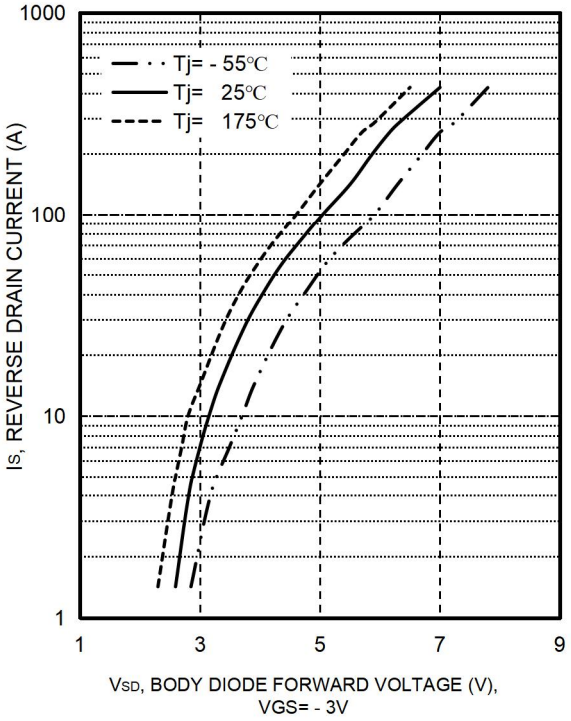


Figure 10. Diode Forward Voltage vs. Current

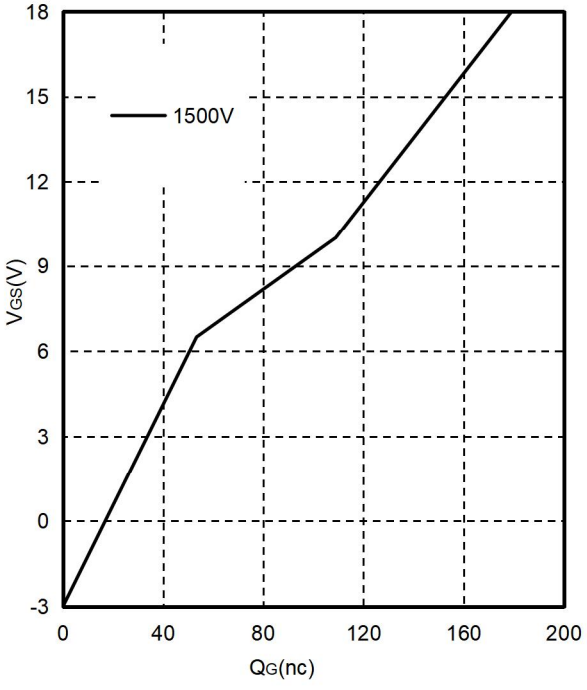


Figure 11. Gate−to−Source Voltage vs. Total Charge (I_D=60A)

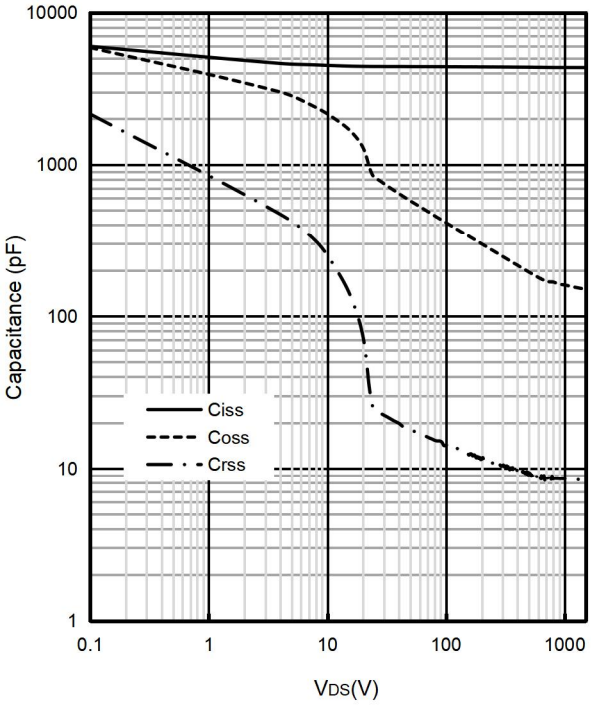


Fig 12. Typical capacitance as a function of Drain-source voltage (V_{GS} =0V, f=1MHz)

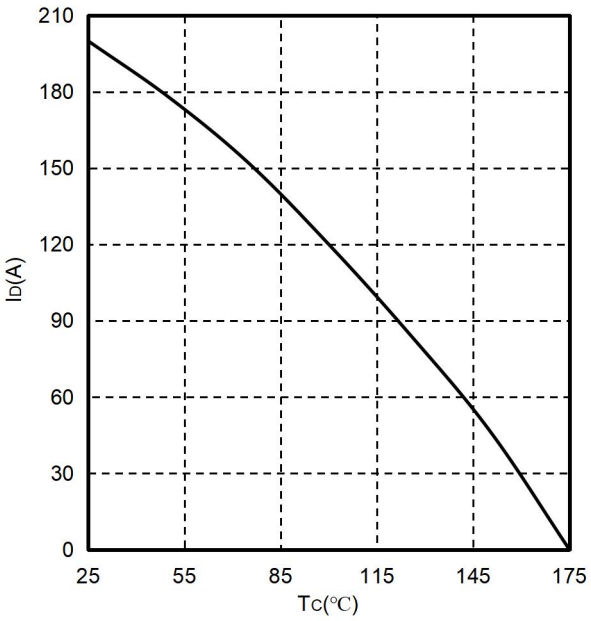


Figure 13.Maximum Continuous Drain Current vs. Case Temperature, V_{GS}=18V

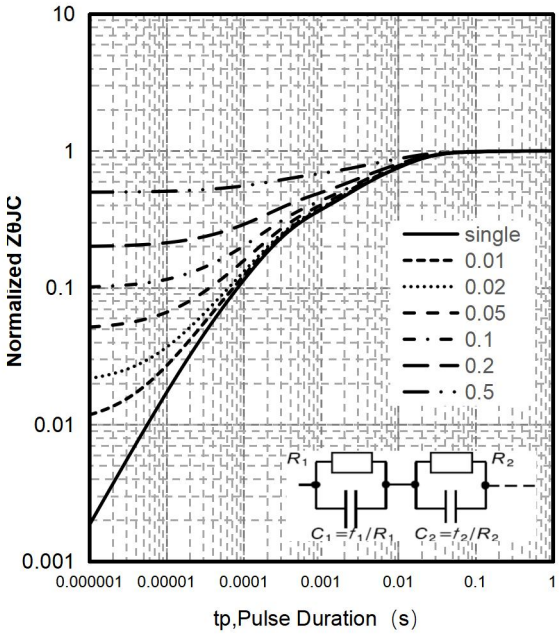
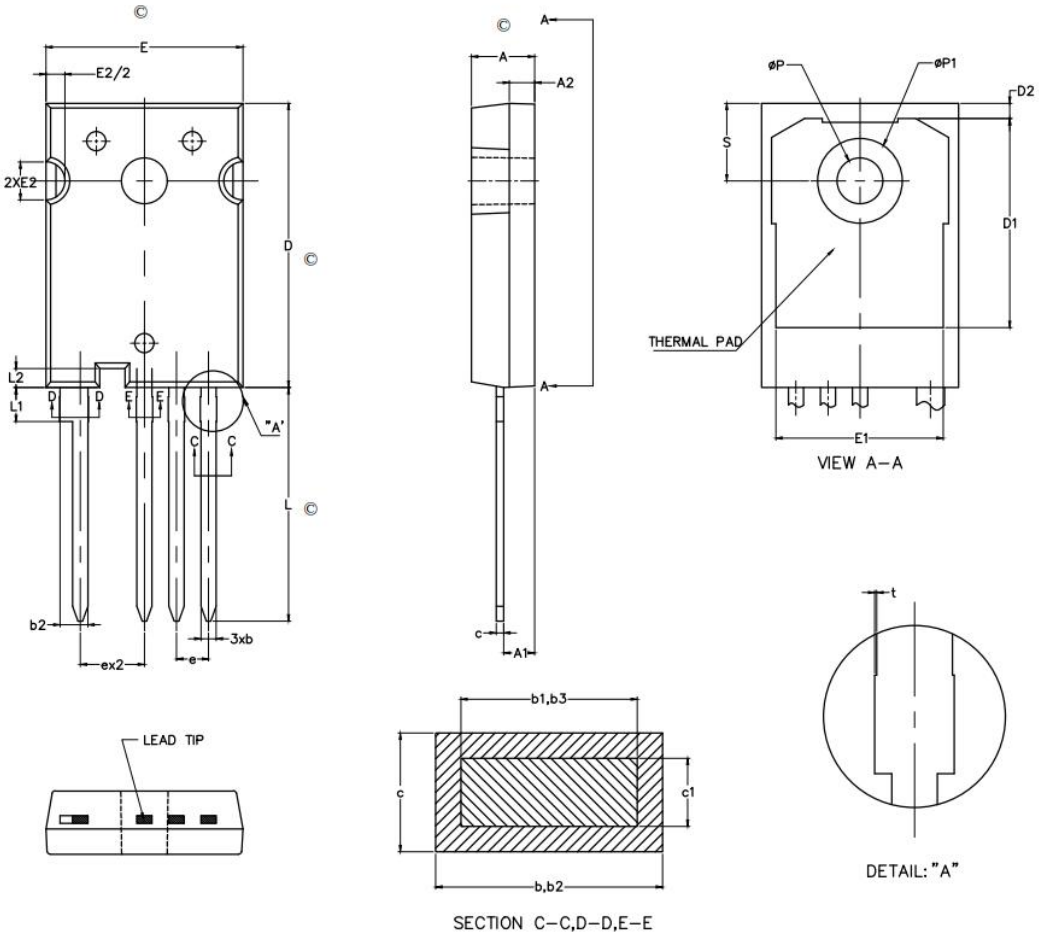


Fig 14. Transient Thermal



SYMBOLS	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.15	1.22	0.045	0.048
b2	2.16	2.26	0.085	0.089
b3	2.15	2.22	0.085	0.087
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	22.40	22.60	0.882	0.890
D1	16.15	16.75	0.640	0.663
D2	1.22	1.53	0.041	0.053
E	15.75	15.90	0.620	0.626
E1	13.26	—	0.552	—
E2	2.90	3.10	0.114	0.122
e	2.54BSC		0.1BSC	
L	18.30	18.60	0.720	0.732
L1	—	2.80	—	0.110
L2	—	1.50	—	0.059
øP	3.50	3.70	0.138	0.146
øP1	—	7.40	—	0.291
S	6.22	6.42	0.238	0.246
t	0.00	0.15	0.000	0.006