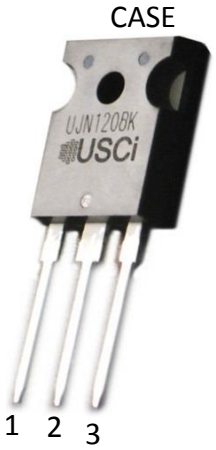
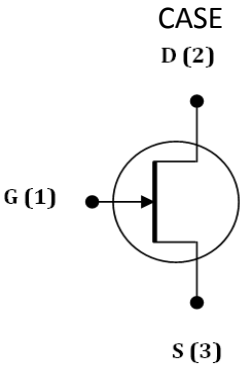
Features

- Low On-Resistance $R_{DS(on)max}$ of 0.080Ω
- Voltage controlled
- Maximum operating temperature of 175°C
- Extremely fast switching not dependent on temperature
- Low gate charge
- Low intrinsic capacitance





Typical Applications

- Over Current Protection Circuits
- DC-AC Inverters
- Switch Mode Power Supplies
- Power Factor Correction Modules
- Motor Drives
- Induction Heating

Part Number	Package	Marking
UJN1208K	**TO-247**	**UJN1208K**

Descriptions

United Silicon Carbide, Inc offers the **xJ series** of high-performance SiC normally-on JFET transistors. This series exhibits ultra-low on resistance ($R_{DS(ON)}$) and gate charge (Qg) allowing for low conduction and switching loss. The device normally-on characteristics with low $R_{DS(ON)}$ at V_{GS} = 0 V is also ideal for current protection circuits without the need for active control, as well as for cascode operation.

Absolute Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Units
Drain-Source Voltage	V_{DS}		1200	V
Gate-Source Voltage	V_{GS}	DC	-20 to +3	V
		AC (1)	-20 to +20	
Continuous Drain Current	I_D	T_C = 25°C, V_{GS} = 0V	21	A
Continuous Drain Current	I_D	T_C = 125°C, V_{GS} = 0V	13	A
Pulsed Drain Current	I_{DM}	T_j = 125°C, V_{GS} = 0V	41	A
		T_j = 175°C, V_{GS} = 0V	35	
Power Dissipation	P_{tot}	T_C = 25°C	136	W
Operating and Storage Temperature	T_J, T_{STG}		-55 to 175	°C
Max Lead Temperature for Soldering, 1/8" from Case for 5 Seconds	T_L		250	°C

(1) +20V AC rating applies for turn-on pulses <200ns applied with external R_G > 1Ω.

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

Typical Performance - Static

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Drain-Source Breakdown Voltage	BV_{DS}	V_{GS}=-20V, I_D=1mA	1200			V
Total Drain Leakage Current	I_D	V_{DS} = 1200V, V_{GS} = -20V, T_J = 25°C		40	250	μA
		V_{DS} = 1200V, V_{GS} = -20V, T_J = 175°C		120	750	
Total Gate Leakage Current	I_G	V_{GS}=-20V, T_j=25°C		0.3	125	μA
		V_{GS}=-20V, T_j=175°C		3		
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=2V, I_F=20A, T_J = 25°C		67	80	mΩ
		V_{GS}=0V, I_F=20A, T_J = 25°C		77	95	
		V_{GS}=2V, I_F=20A, T_J = 175°C		200	240	
		V_{GS}=0V, I_F=20A, T_J = 175°C		230	285	
Gate Threshold Voltage	$V_{G(th)}$	V_{DS} = 5V, I_D = 70mA	-10	-7	-4	V
Gate Resistance	R_G	V_{GS} = 0V, f = 1MHz		6		Ω

Typical Performance - Dynamic

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Input Capacitance	C_{iss}	V_{DS} = 100V, V_{GS} = -20V, f = 100kHz		500		pF
Output Capacitance	C_{oss}			94		
Reverse Transfer Capacitance	C_{rss}			93		
Effective Output Capacitance, Energy Related	$C_{oss(er)}$	V_{DS} = 0V to 600V, V_{GS} = -20V		53		pF
Total Gate Charge	Q_G	V_{DS}=600V, I_D = 20A, V_{GS}=-15V to 2.5V		62		nC
Gate-Drain Charge	Q_{GD}			44		
Gate-Source Charge	Q_{GS}			6		
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=600V, I_D=20A, Gate Driver =-15V to +5V, $R_{G,EXT}$ = 2.5Ω, Inductive Load, T_J = 25°C		11		ns
Rise Time	t_r			30		
Turn-off Delay Time	$t_{d(off)}$			23		
Fall Time	t_f			26		
Turn-on Energy	E_{ON}			202		µJ
Turn-off Energy	E_{OFF}			210		
Total Switching Energy	E_{TOTAL}			412		
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=600V, I_D=20A, Gate Driver =-15V to +5V, $R_{G,EXT}$ = 2.5Ω, Inductive Load, T_J = 150°C		11		ns
Rise Time	t_r			33		
Turn-off Delay Time	$t_{d(off)}$			22		
Fall Time	t_f			23		
Turn-on Energy	E_{ON}			220		µJ
Turn-off Energy	E_{OFF}			174		
Total Switching Energy	E_{TOTAL}			394		

Thermal characteristics

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$				1.1	°C/W

Typical Performance Diagrams

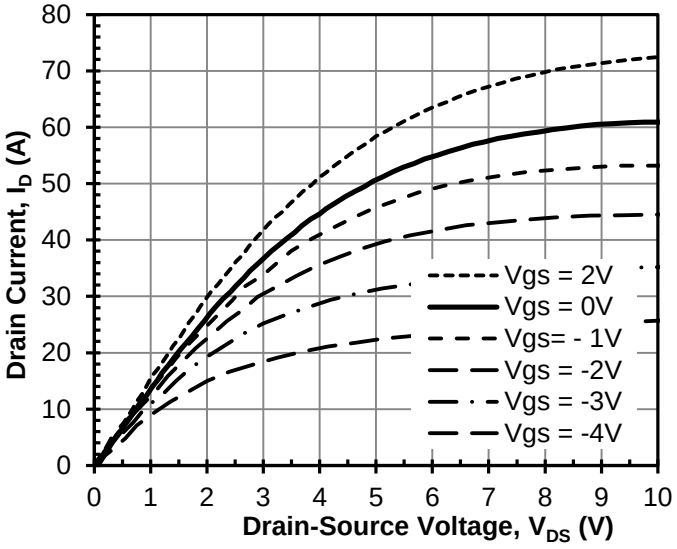


Figure 1 Typical output characteristics at T_j = 25°C

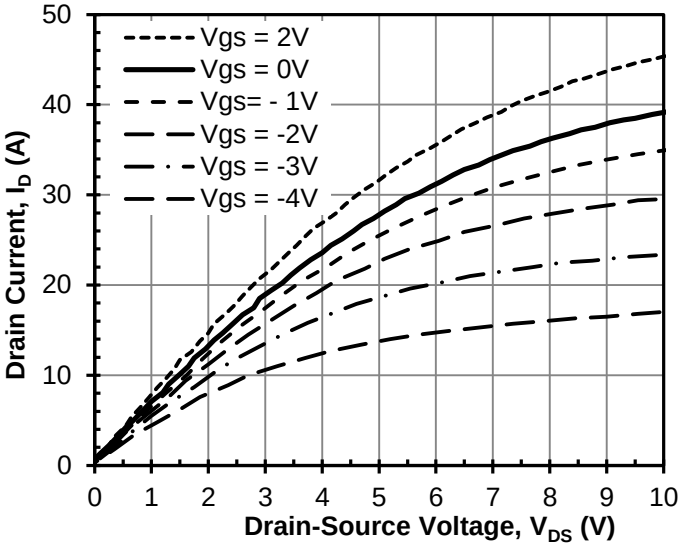


Figure 2 Typical output characteristics at T_j = 125°C

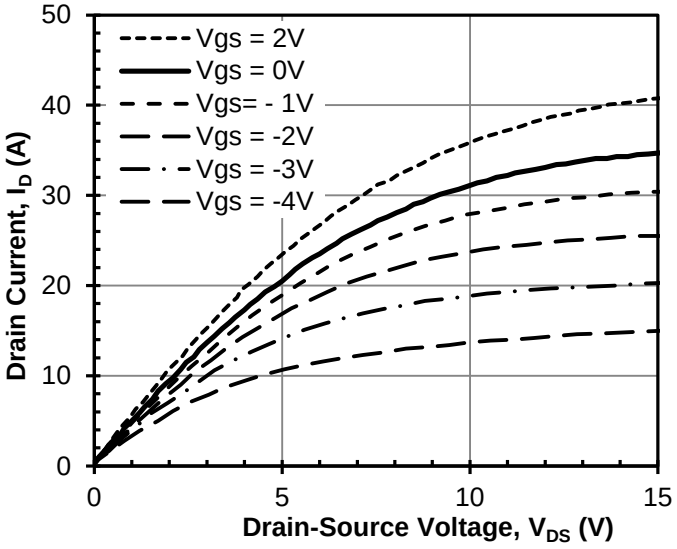


Figure 3 Typical output characteristics at T_j = 175°C

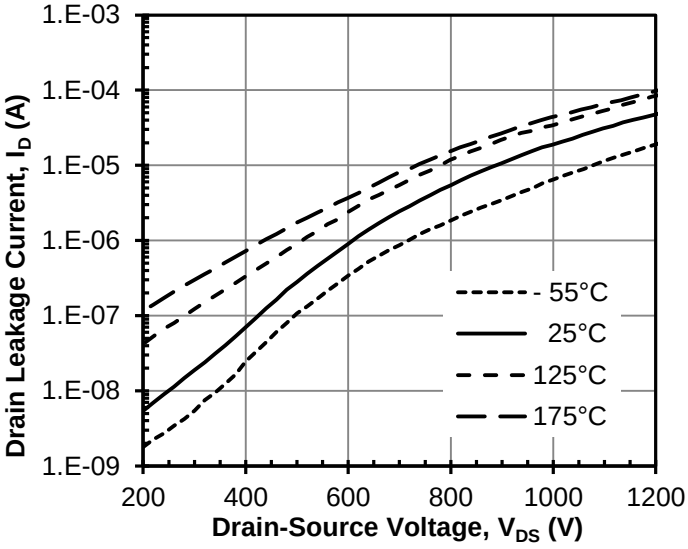


Figure 4 Typical drain-source leakage at V_{GS} = -20V

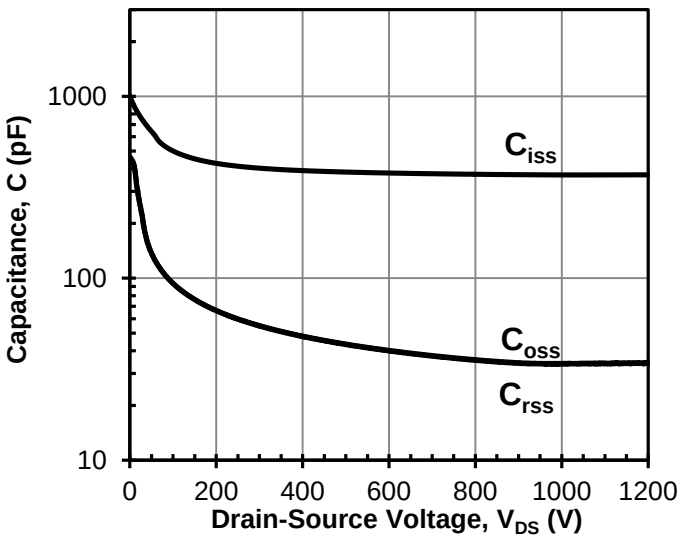


Figure 5 Typical capacitances at 100kHz and V_{GS} = -20V

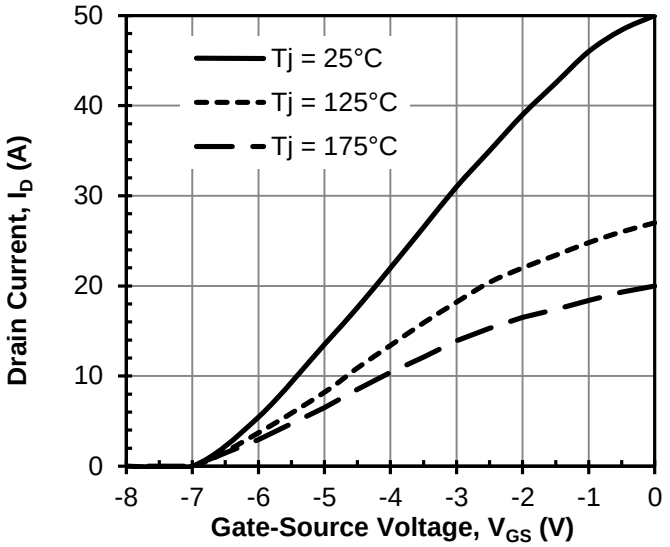


Figure 6 Typical transfer characteristics at V_{DS} = 5V

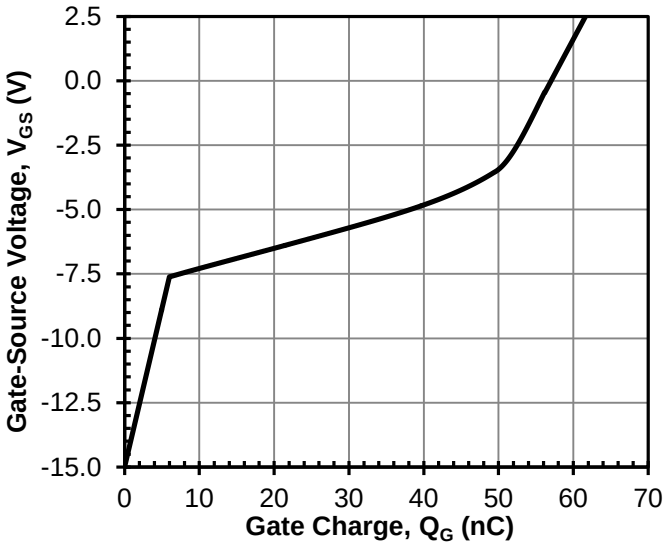


Figure 7 Typical gate charge at V_{DS} = 600V and I_D = 20A

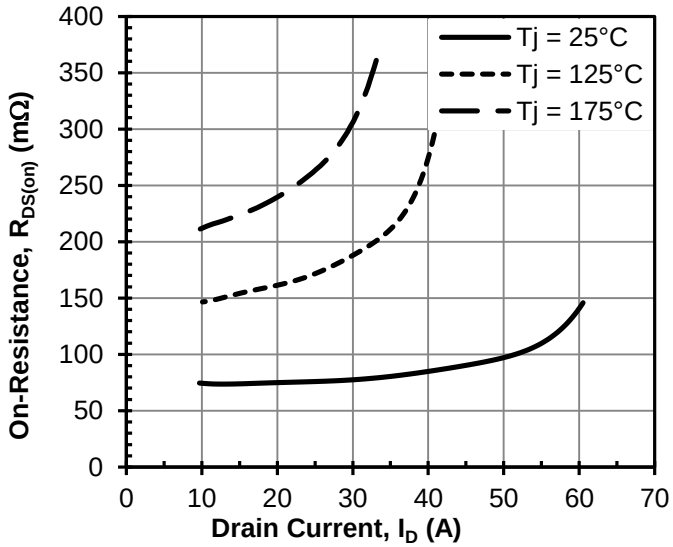


Figure 8 Typical drain-source on-resistance at V_{GS} = 0V

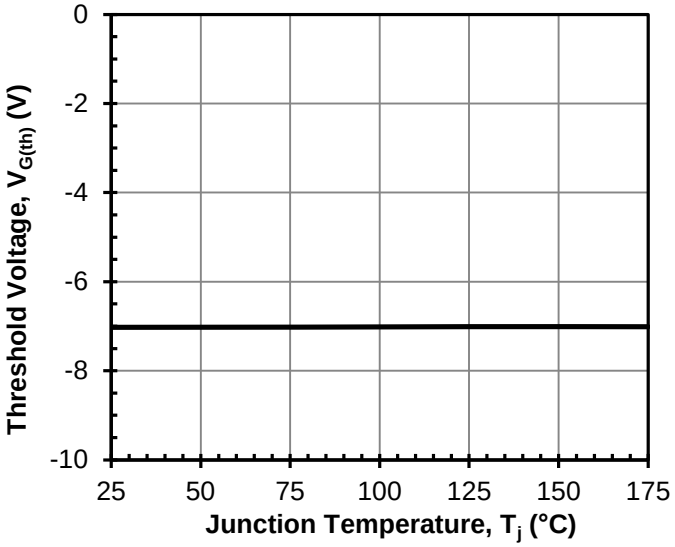


Figure 9 Threshold voltage vs. Tj
at V_{DS} = 5V and I_D = 70mA

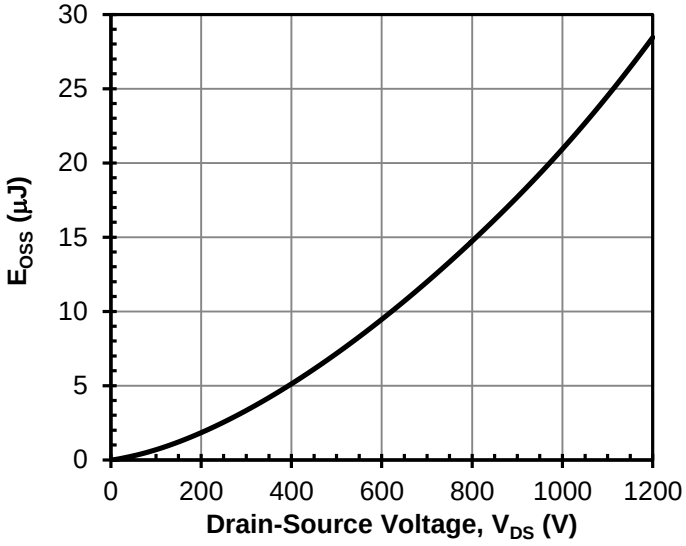


Figure 10 Typical stored energy in C_{OSS}
at V_{GS} = -20V

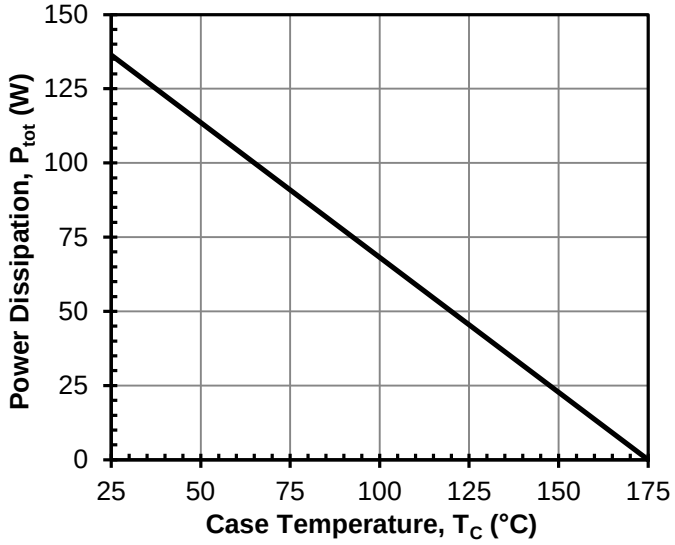


Figure 11 Total power Dissipation

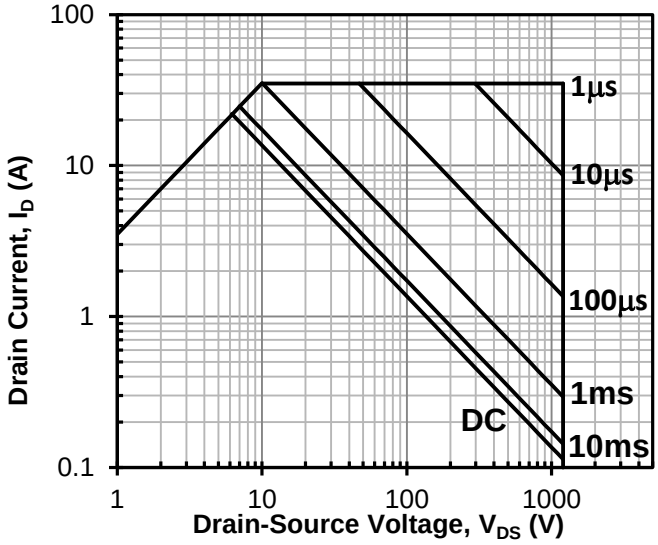


Figure 12 Safe operation area
T_c = 25°C, Parameter t_p

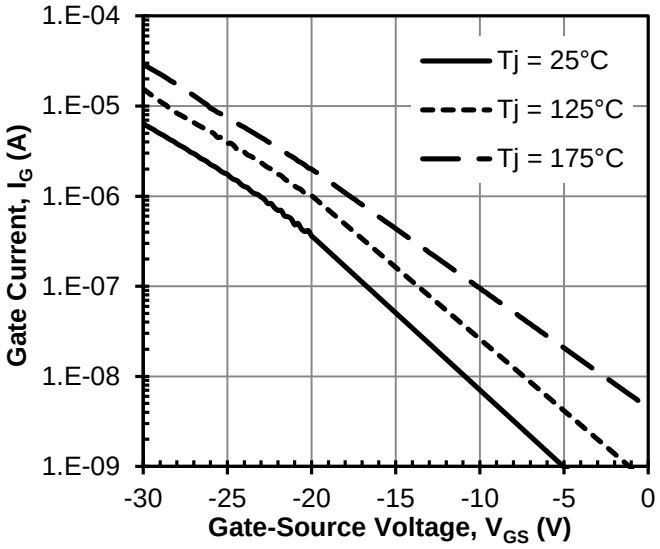


Figure 13 Typical gate leakage current at V_{DS} = 0V

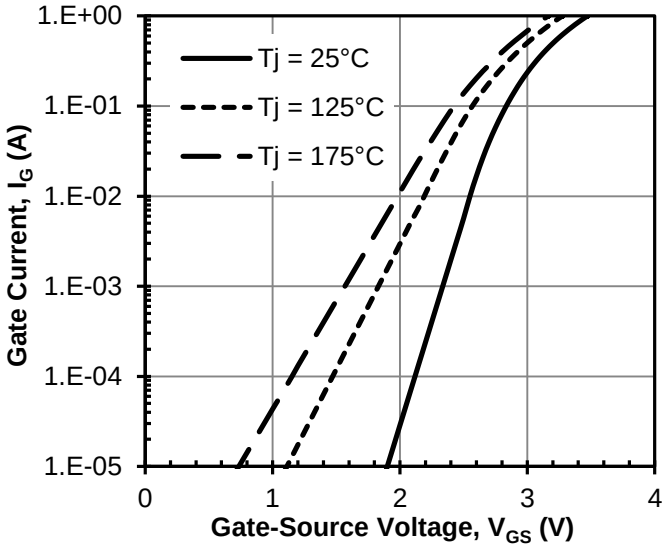


Figure 14 Typical gate forward current at V_{DS} = 0V

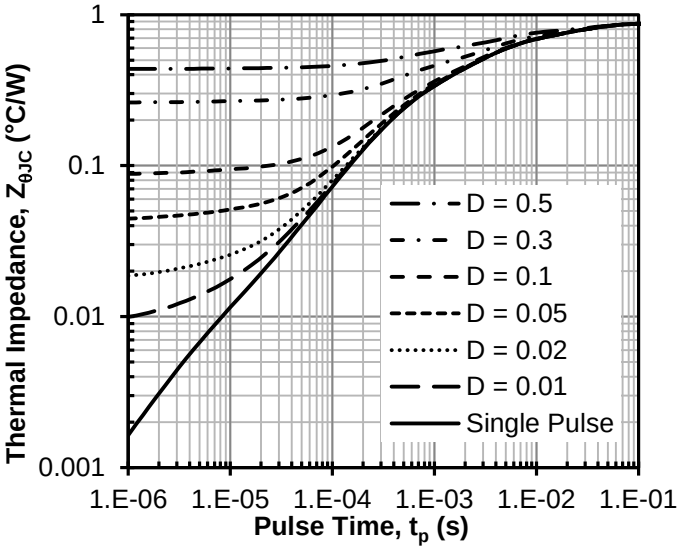
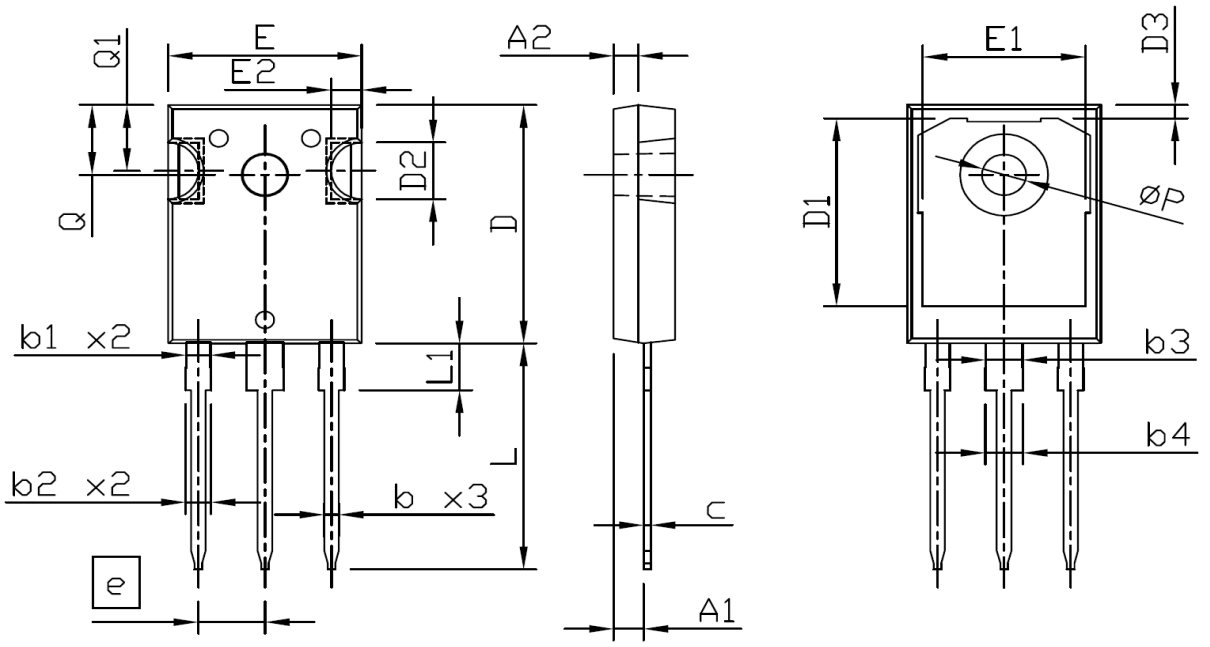
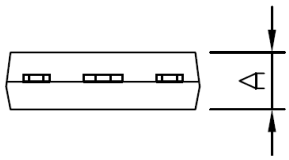


Figure 15 Typical transient thermal impedance

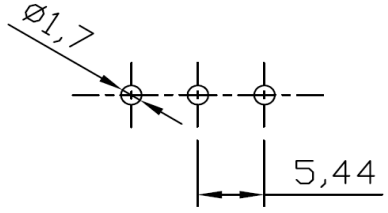
Mechanical Characteristics





SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.90	5.00	5.10	0.193	0.197	0.201
A1	2.31	2.42	2.52	0.091	0.095	0.099
A2	1.90	2.00	2.10	0.075	0.079	0.083
b	1.16	1.22	1.27	0.046	0.048	0.050
b1	1.96	2.02	2.07	0.078	0.080	0.081
b2	2.00	2.10	2.20	0.079	0.083	0.087
b3	2.96	3.02	3.07	0.117	0.119	0.121
b4	3.00	3.10	3.20	0.118	0.122	0.126
c	0.59	0.62	0.66	0.023	0.024	0.026
D	20.90	21.00	21.10	0.823	0.827	0.831
D1	16.25	16.55	16.85	0.640	0.652	0.663
D2		5.00 TYP			0.197 TYP	
D3	1.05	1.20	1.35	0.041	0.047	0.053
e		5.44 BSC			0.214 BSC	
E	15.70	15.80	15.90	0.618	0.622	0.626
E1	13.06	13.26	13.50	0.514	0.522	0.530
E2		2.50 TYP			0.098 TYP	
L	19.72	19.92	20.12	0.776	0.784	0.792
L1	---	---	4.30	---	---	0.169
Q		6.15 BSC			0.242 BSC	
Q1	5.60	5.80	6.00	0.220	0.228	0.236
øP	3.55	3.60	3.70	0.140	0.142	0.146

RECOMMENDED LAND PATTERN



UNIT: mm

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