

N-Channel 120 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
120	0.0022 at V _{GS} = 10 V	260 ^a

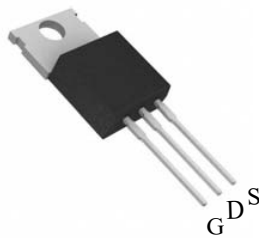
FEATURES

- TrenchFET[®] Power MOSFET
- New Package with Low Thermal Resistance
- 100 % R_g Tested

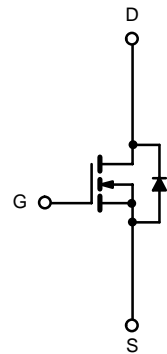


RoHS
COMPLIANT

TO-220 Pin Configuration



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_C = 25 °C, unless otherwise noted

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	120	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 175 °C)	I _D	T _C = 25 °C	260 ^a	A
		T _C = 125 °C	228 ^a	
Pulsed Drain Current	I _{DM}	860		
Avalanche Current	I _{AR}	210		
Repetitive Avalanche Energy ^b	E _{AR}	2900	mJ	
Maximum Power Dissipation ^b	P _D	T _C = 25 °C	418 ^c	W
		T _A = 25 °C	6.17	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	R _{thJA}	35	°C/W
Junction-to-Case (Drain)	R _{thJC}	0.3	

Notes:

- Package limited.
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).

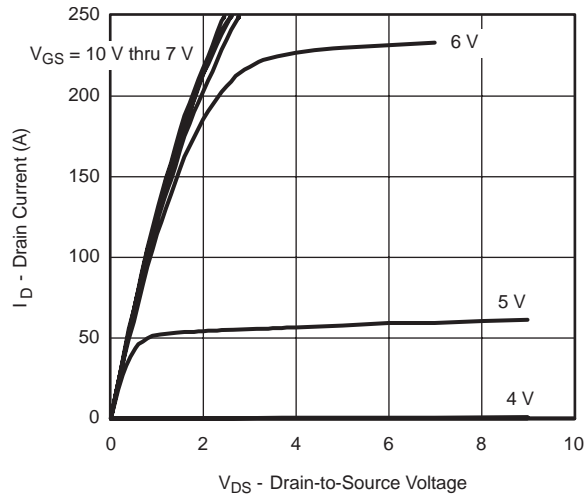
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	120			V	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4		
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	μA	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50		
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250		
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	260			A	
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.0022	0.0026	Ω	
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.0045		
		$V_{GS} = 10\text{ V}, I_D = 15\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.0062		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	65			S	
Dynamic^b							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		8050		μF	
Output Capacitance	C_{oss}			1130			
Reverse Transfer Capacitance	C_{rss}			238			
Total Gate Charge ^c	Q_g	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		105	150	nC	
Gate-Source Charge ^c	Q_{gs}			45			
Gate-Drain Charge ^c	Q_{gd}			24			
Gate Resistance	R_g		1.0		6.3	Ω	
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 15\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		20	33	ns	
Rise Time ^c	t_r			115	180		
Turn-Off Delay Time ^c	$t_{d(off)}$			53	85		
Fall Time ^c	t_f			17	33		
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^\circ\text{C}^b$							
Continuous Current	I_S				260	A	
Pulsed Current	I_{SM}				860		
Forward Voltage ^a	V_{SD}	$I_F = 85\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V	
Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		75	153	ns	
Peak Reverse Recovery Charge	$I_{RM(REC)}$				5.5	10	A
Reverse Recovery Charge	Q_{rr}				0.15	0.33	μC

Notes:

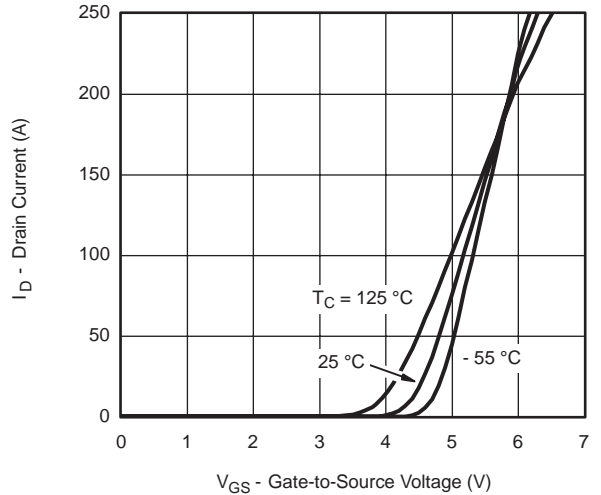
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

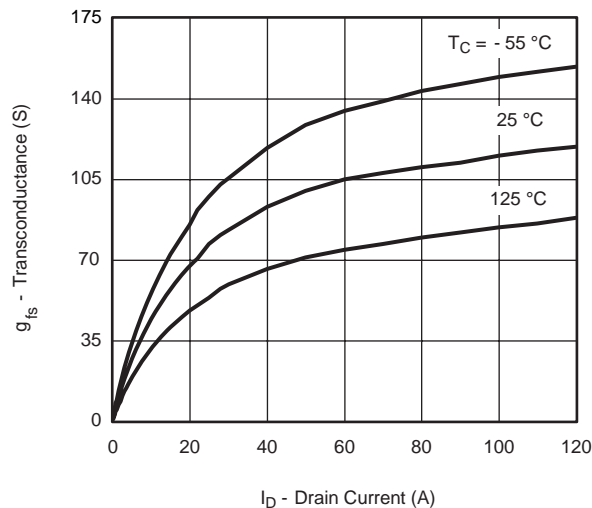
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



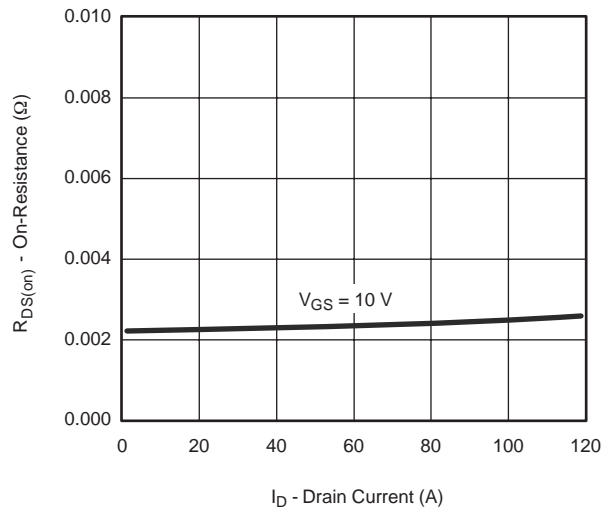
V_{DS} - Drain-to-Source Voltage
Output Characteristics



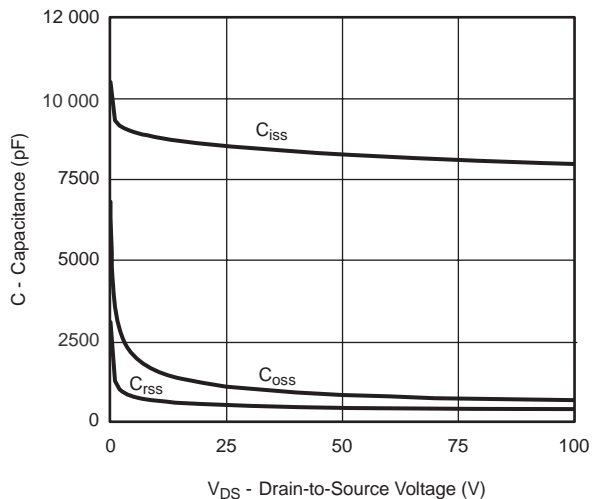
V_{GS} - Gate-to-Source Voltage (V)
Transfer Characteristics



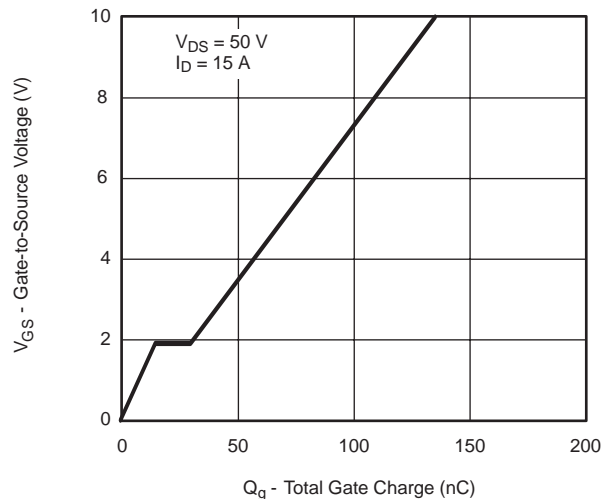
I_D - Drain Current (A)
Transconductance



I_D - Drain Current (A)
On-Resistance vs. Drain Current

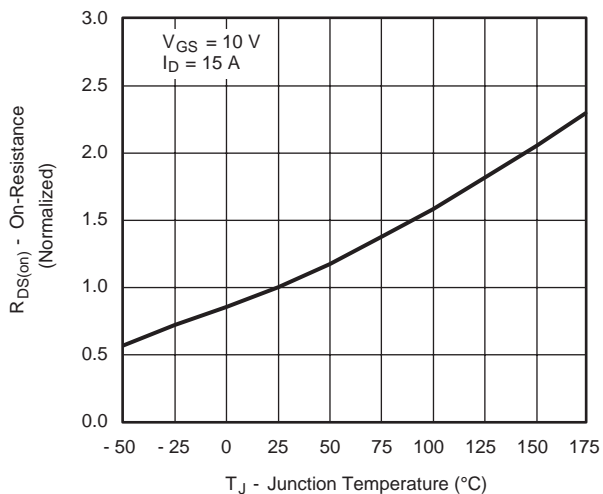


V_{DS} - Drain-to-Source Voltage (V)
Capacitance

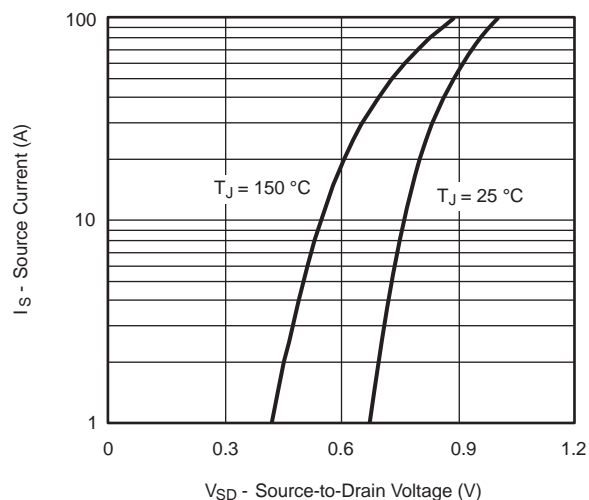


Q_g - Total Gate Charge (nC)
Gate Charge

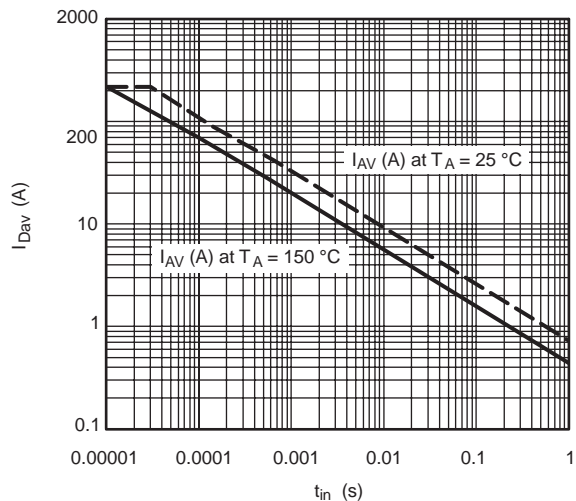
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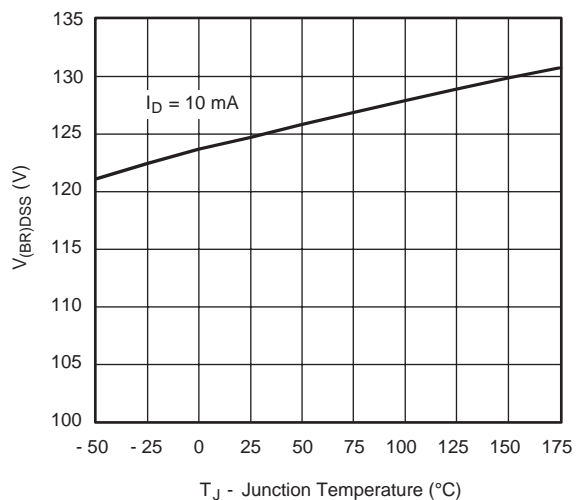
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

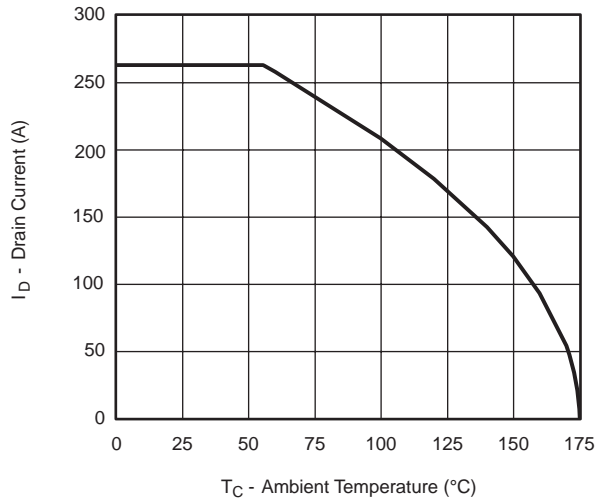


Avalanche Current vs. Time

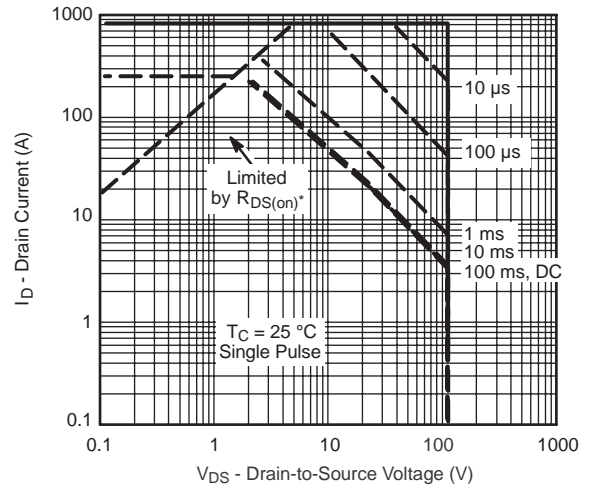


Drain Source Breakdown vs. Junction Temperature

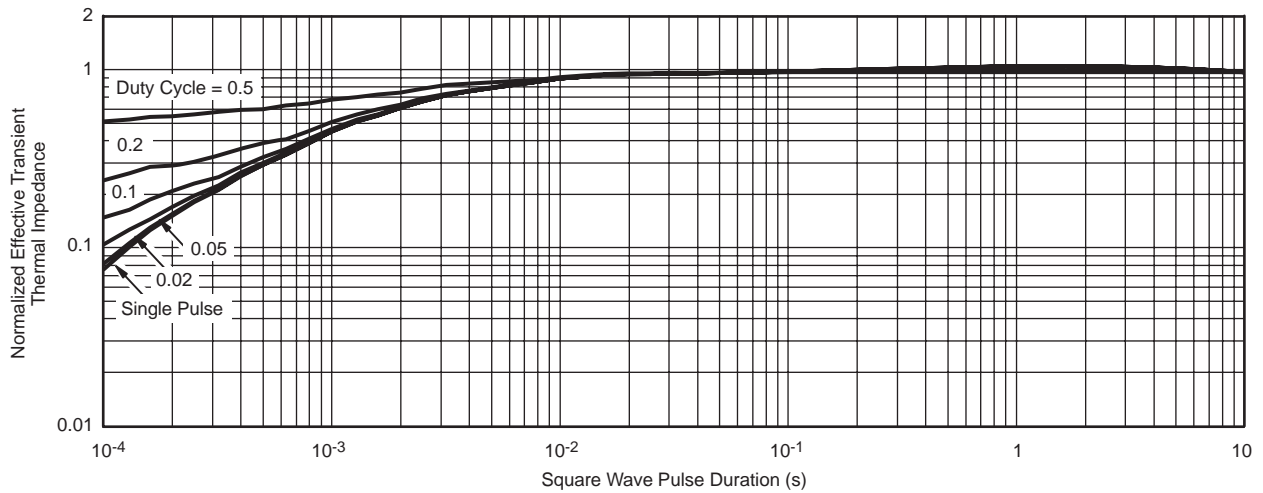
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

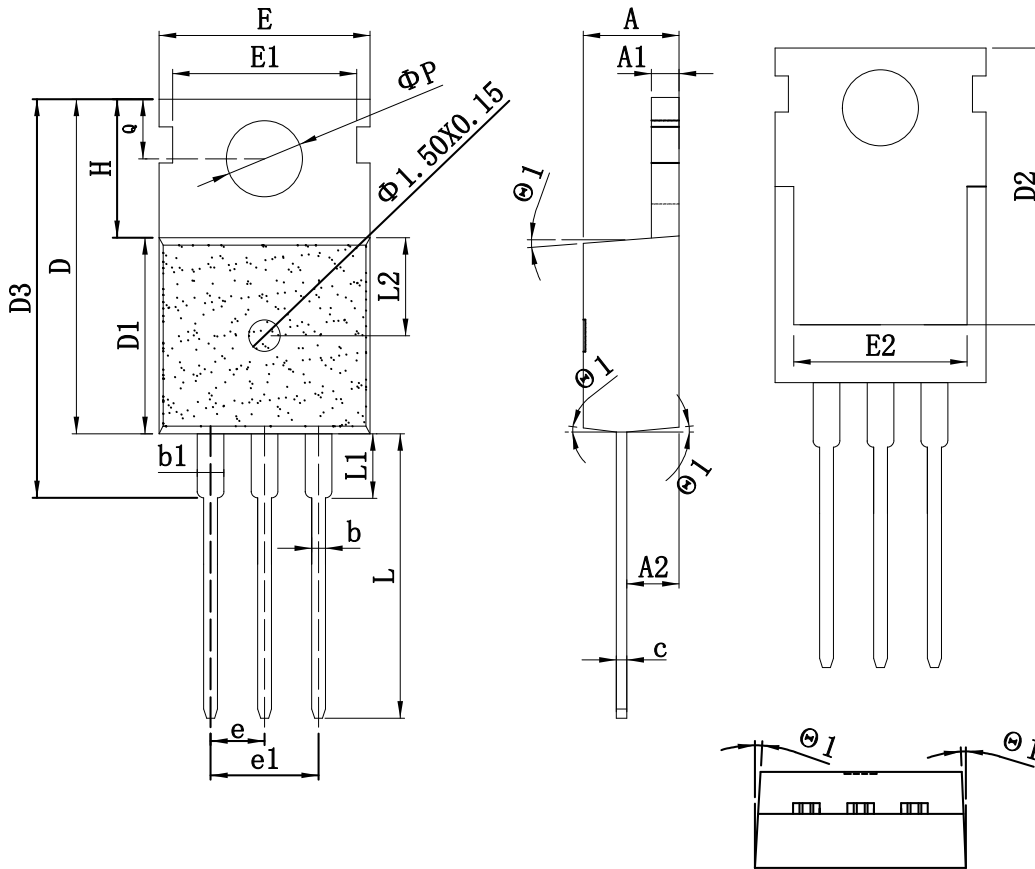


Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

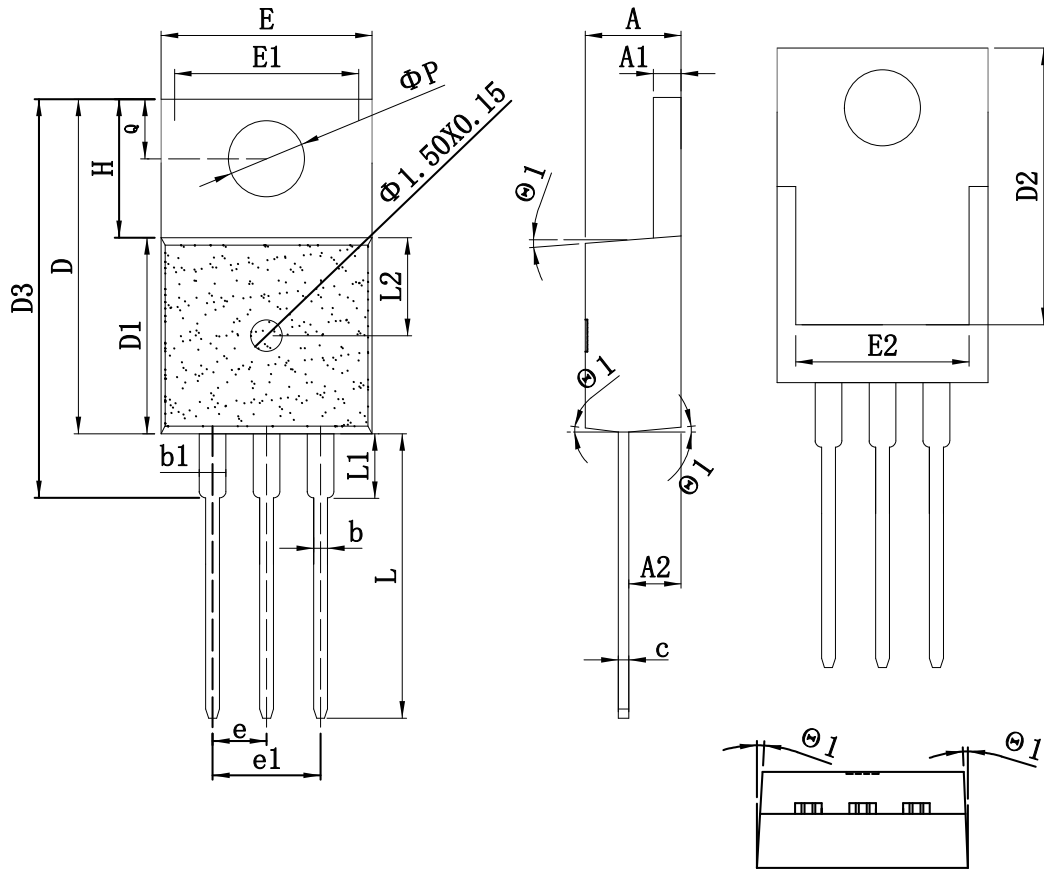
TO-220_3L-A PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	mm			SYMBOL	mm		
	MIN	TYP	MAX		MIN	TYP	MAX
A	4.15	4.50	4.80	E1	8.25	8.70	9.15
A1	1.15	1.30	1.50	E2	7.20	8.00	8.80
A2	2.10	2.40	2.65	e	2.38	2.54	2.74
b	0.65	0.80	1.00	e1	5.08REF		
b1	1.10	1.33	1.80	H	6.20	6.50	6.90
c	0.35	0.50	0.65	L	12.75	13.28	13.70
D	14.25	15.75	16.15	L1	-	-	3.50
D1	8.70	9.20	9.60	L2	2.30	4.65	7.00
D2	12.30	13.10	13.85	ϕP	3.40	3.65	3.85
D3	16.20	18.80	20.60	Q	2.50	2.80	3.00
E	8.68	10.02	11.00	θ	2°	-	7°

TO-220_3L-B PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	mm			SYMBOL	mm		
	MIN	TYP	MAX		MIN	TYP	MAX
A	4.15	4.50	4.80	E1	8.25	8.70	9.15
A1	1.15	1.30	1.50	E2	7.20	8.00	8.80
A2	2.10	2.40	2.65	e	2.38	2.54	2.74
b	0.65	0.80	1.00	e1	5.08REF		
b1	1.10	1.33	1.80	H	6.20	6.50	6.90
c	0.35	0.50	0.65	L	12.75	13.28	13.70
D	14.25	15.75	16.15	L1	-	-	3.50
D1	8.70	9.20	9.60	L2	2.30	4.65	7.00
D2	12.30	13.10	13.85	ϕP	3.40	3.65	3.85
D3	16.20	18.80	20.60	Q	2.50	2.80	3.00
E	8.68	10.02	11.00	θ	2°	-	7°

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