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SUP53P06-20

Vishay Siliconix

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 60	0.0195 at V _{GS} = - 10 V	- 53	76 nC
	0.0250 at V _{GS} = - 4.5 V	- 42	

FEATURES

- TrenchFET® Power MOSFET
- 100 % UIS Tested
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912

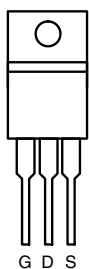


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

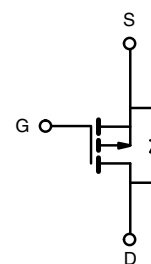
- Load Switch

TO-220AB



Top View

DRAIN connected to TAB



P-Channel MOSFET

Ordering Information: SUP53P06-20-E3 (Lead (Pb)-free)
SUP53P06-20-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	- 60	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 53 ^a
		T _C = 70 °C	- 46.8
		T _A = 25 °C	9.2 ^b
		T _A = 70 °C	- 8.1 ^b
Pulsed Drain Current	I _{DM}	- 150	A
Avalanche Current Pulse	L = 0.1 mH I _{AS}	- 45	
Single Pulse Avalanche Energy	E _{AS}	101	
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	69 ^a
		T _A = 25 °C	2.1 ^b
Maximum Power Dissipation	P _D	T _C = 25 °C	104.2 ^a
		T _C = 70 °C	66.7 ^a
		T _A = 25 °C	3.1 ^b
		T _A = 70 °C	2 ^b
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	Steady State	R _{thJA}	33	40	°C/W
Maximum Junction-to-Case	Steady State	R _{thJC}	0.98	1.2	

Notes:

a. Based on T_C = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

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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}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		68		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-5.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1		-3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-120			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		0.0160	0.0195	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		0.0200	0.0250	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -50\text{ A}$	20			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		3500		μF
Output Capacitance	C_{oss}			390		
Reverse Transfer Capacitance	C_{rss}			290		
Total Gate Charge	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -55\text{ A}$		76	115	nC
				38	60	
Gate-Source Charge	Q_{gs}	$V_{DS} = -30\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -55\text{ A}$		16		
Gate-Drain Charge	Q_{gd}			19		
Gate Resistance	R_g	$f = 1\text{ MHz}$		5.2		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -2\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		10	15	ns
Rise Time	t_r			7	15	
Turn-Off Delay Time	$t_{d(off)}$			70	110	
Fall Time	t_f			40	60	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-69	A
Pulse Diode Forward Current ^a	I_{SM}				-150	
Body Diode Voltage	V_{SD}	$I_S = -30\text{ A}$		-1	-1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		45	68	ns
Body Diode Reverse Recovery Charge	Q_{rr}			59	120	nC
Reverse Recovery Fall Time	t_a			29		ns
Reverse Recovery Rise Time	t_b			16		

Notes:

 a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

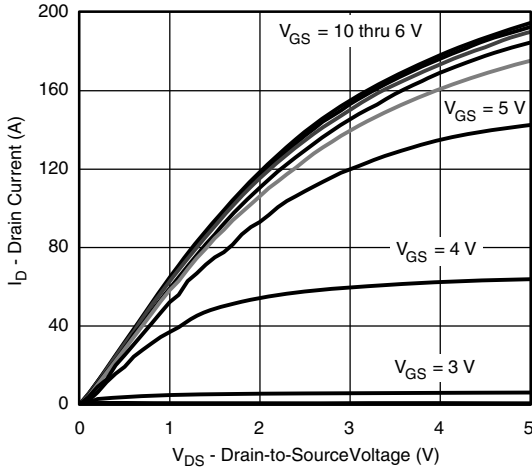
b. Guaranteed by design, not subject to production testing.

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.

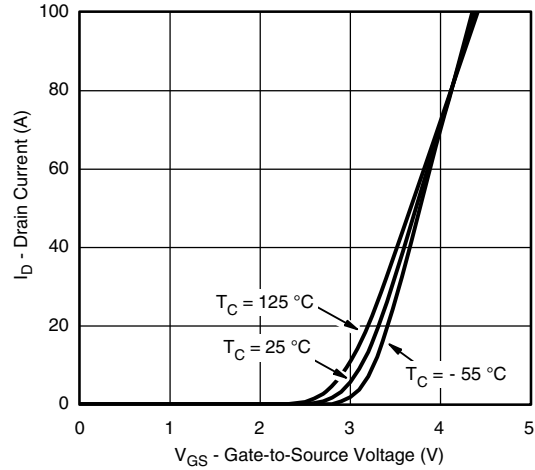


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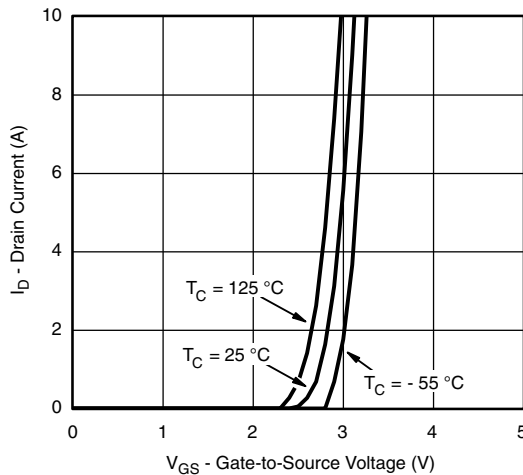
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



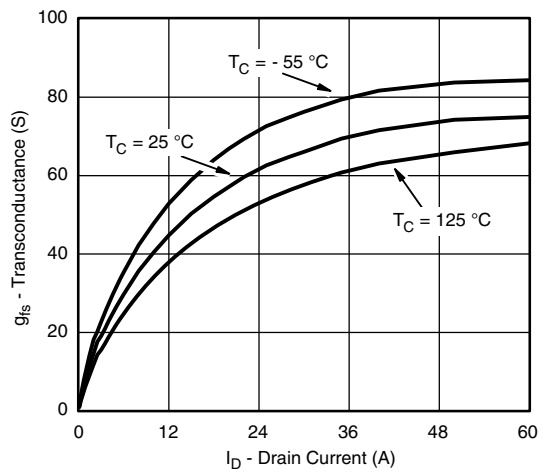
Output Characteristics



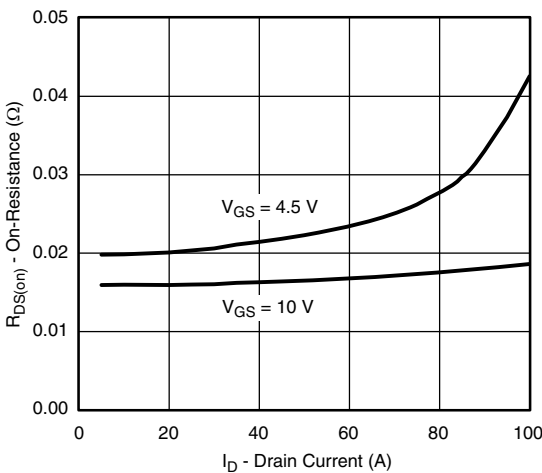
Transfer Characteristics



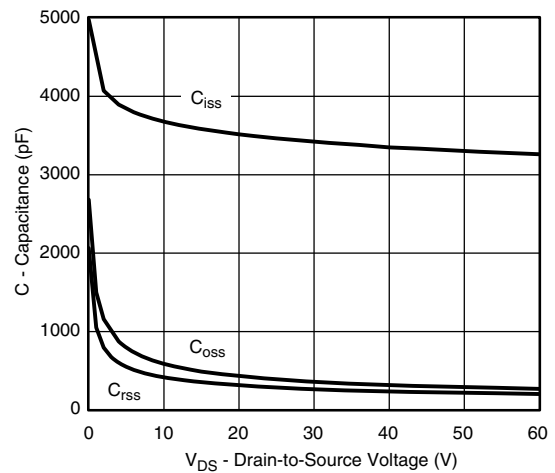
Transfer Characteristics



Transconductance



On-Resistance vs. Drain Current



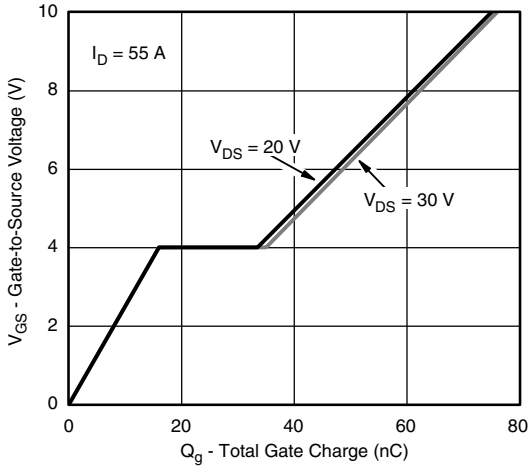
Capacitance

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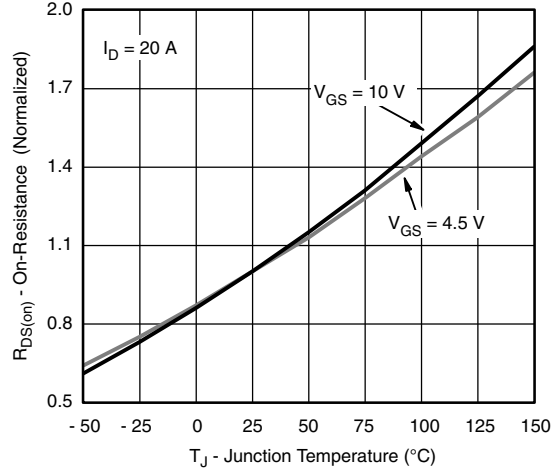
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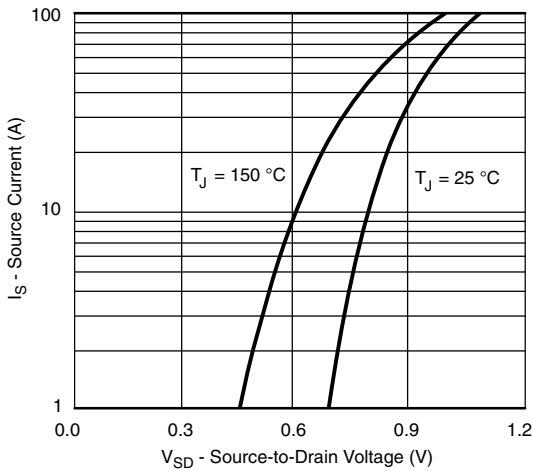
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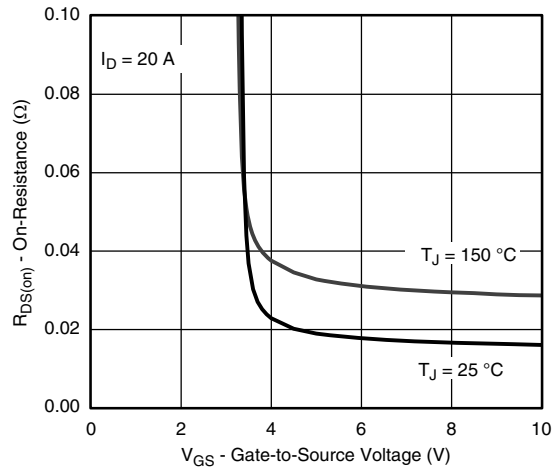
Gate Charge



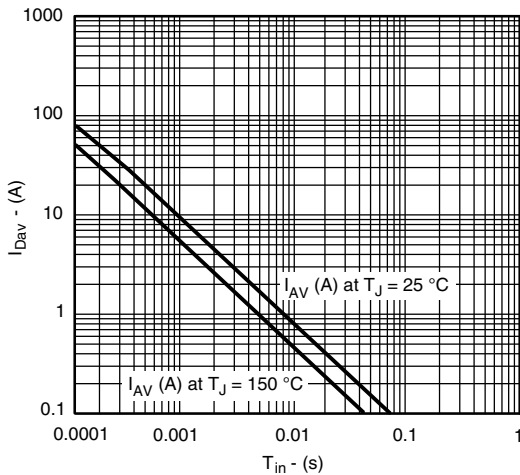
On-Resistance vs. Gate-to-Source Voltage



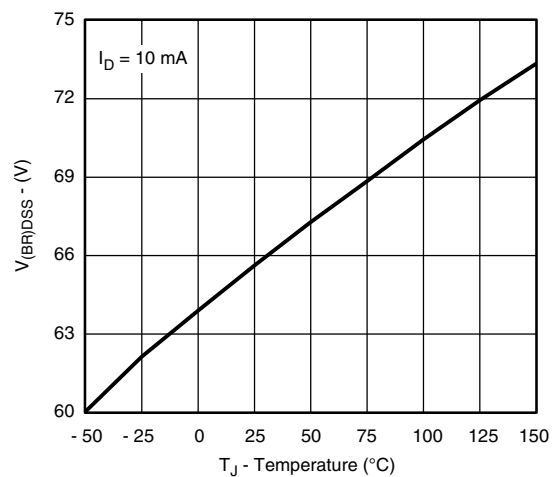
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Avalanche Current Capability vs. Time

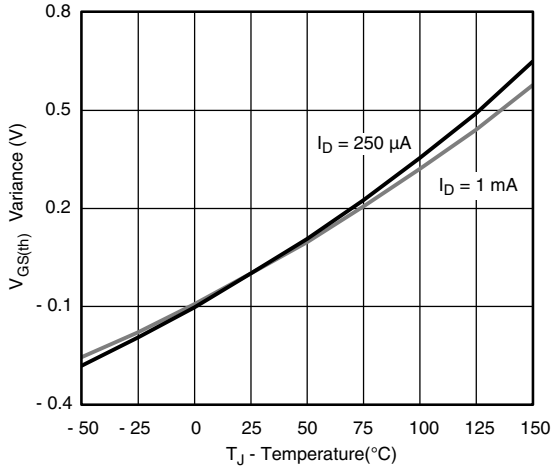


Drain-Source Breakdown Voltage vs. Junction Temperature

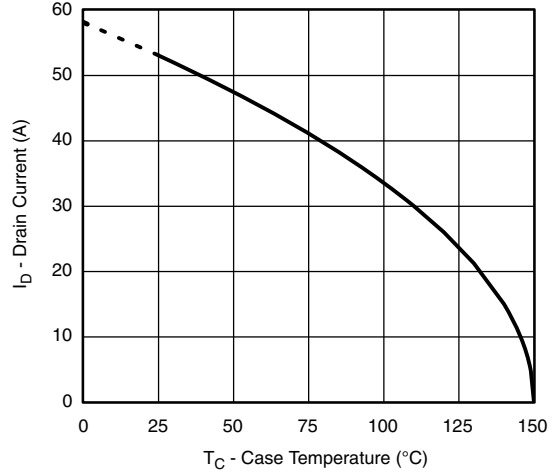


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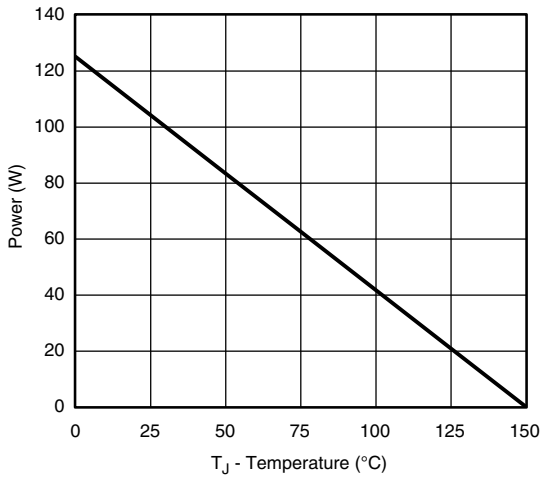
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



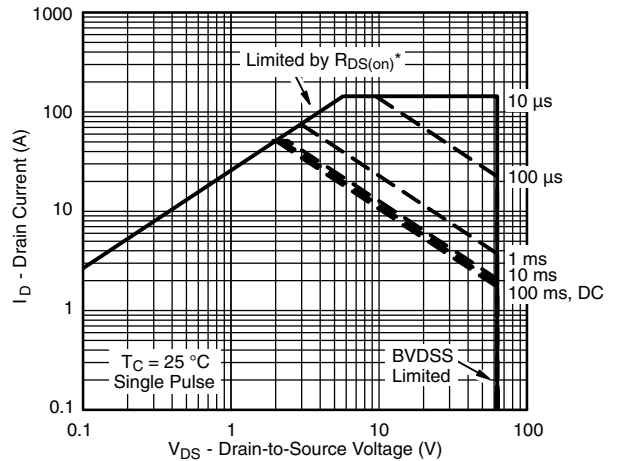
Threshold Voltage



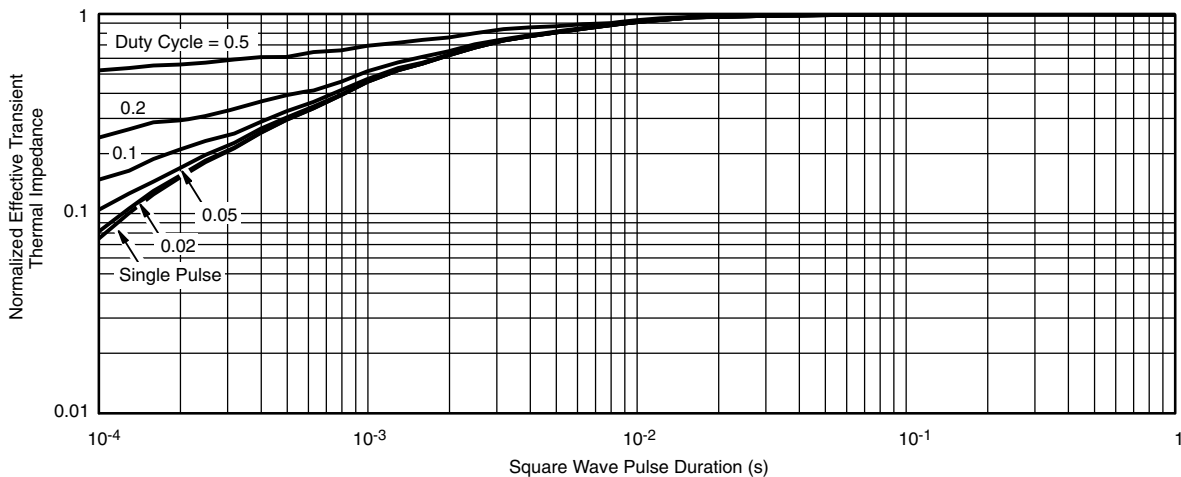
Max. Drain Current vs. Case Temperature



Power Derating, Junction-to-Case



Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Case

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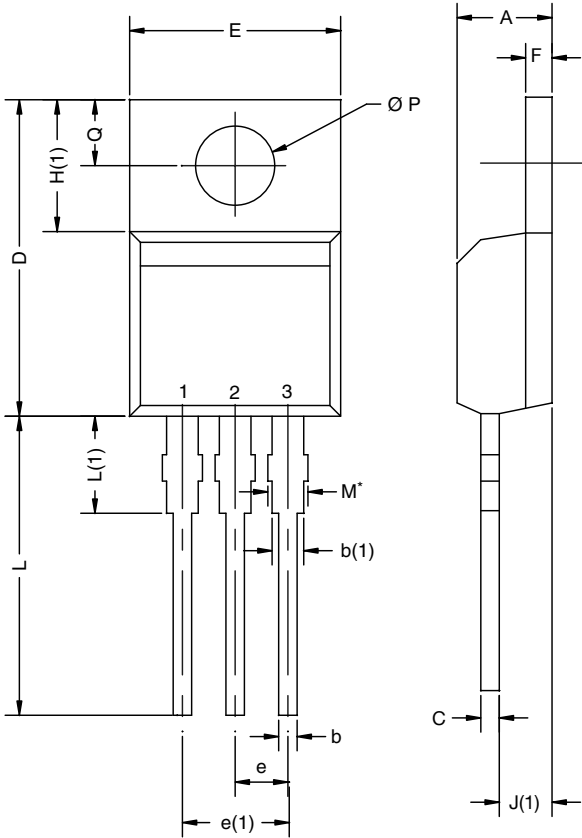


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Package Information

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TO-220AB

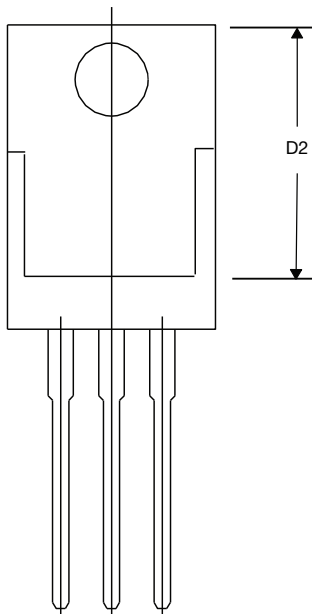


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: T14-0413-Rev. P, 16-Jun-14
DWG: 5471

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM





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