IceMOS Technology

Preliminary

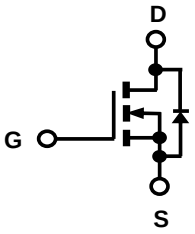
ICES10N60D

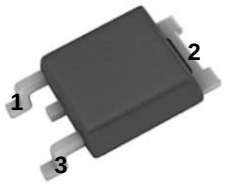
ICES10N60D N-Channel Enhancement Mode MOSFET

Product Summary			
I_D	T_A=25°C	10A	Max
$V_{(BR)DSS}$	I_D=250uA	600V	Min
$r_{DS(on)}$	V_{GS}=10V	0.315	Typ
Q_g	V_{DS}=480V	40nC	Typ

Features

- Low $r_{DS(on)}$
- Ultra Low Gate Charge
- High d*v*/d*t* capability
- High Unclamped Inductive Switching (UIS) capability
- High peak current capability
- Increased transconductance performance
- Optimized design for high performance power systems





T0252

Standard Metal Heatsink

1=Gate, 2=Drain, 3=Source.

RoHS COMPLIANT RoHS (EU) 2015/863

CE

HALOGEN FREE

ICEMOS OWNS THE FUNDAMENTAL PATENTS FOR SUPERJUNCTION MOSFETS. THE MAJORITY OF THESE PATENTS HAVE 17 to 20 YEARS OF REMAINING LIFE. THIS PORTFOLIO HAS GRANTED PATENTS ISSUED IN USA, CHINA, KOREA, JAPAN, TAIWAN & EUROPE.

Maximum ratings [a] , at T_j=25°C, unless otherwise specified

Parameter	*Symbol*	*Conditions*	*Value*	*Unit*
Continuous drain current	I_D	T_c=25°C	10	A
		T_c=100°C	6.6	
Pulsed drain current	$I_{D, pulse}$	T_c=25°C	30	A
Avalanche energy, single pulse	E_{AS}	I_D=7A	245	mJ
Avalanche current, repetitive	I_{AR}	limited by $T_j$max	7	A
MOSFET d*v*/d*t* ruggedness	d*v*/d*t*	V_{DS}=480V, I_D=10A, T_j=125°C	50	V/ns
Gate source voltage	V_{GS}	Static	±20	V
		AC (*f*>1Hz)	±30	
Power dissipation	P_{tot}	T_c=25°C	108	W
Operating and storage temperature	T_j, T_{stg}		-55 to +150	°C

a limited by Tjmax

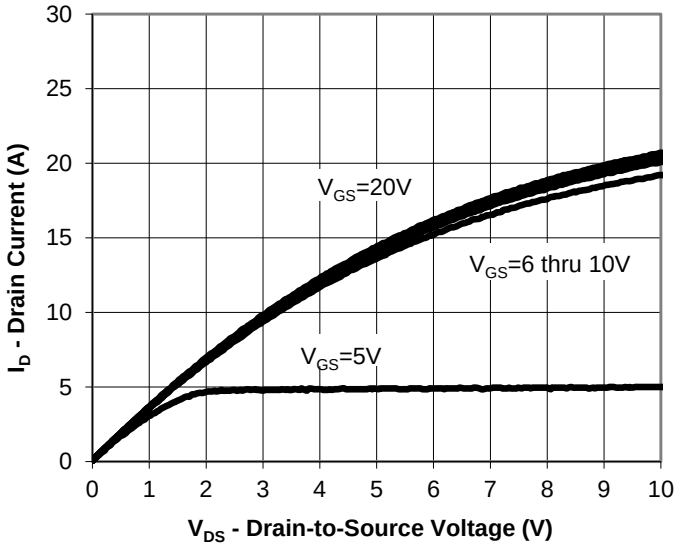
Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	
Thermal characteristics						
Thermal resistance, junction-case [a]	R_{thJC}		-	-	1.15	°C/W
Thermal resistance, junction-ambient [a]	R_{thJA}	leaded	-	-	62	°C/W
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics , at T_j=25°C, unless otherwise specified

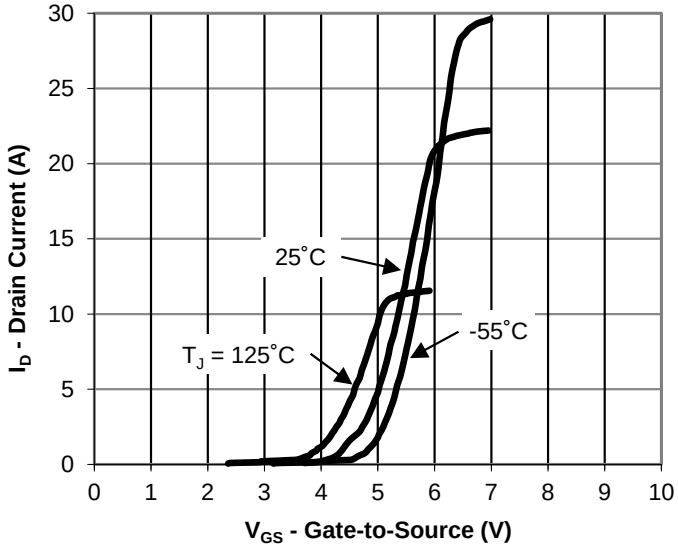
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=250μA	600	640	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.1	3	3.9	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=600V, V_{GS}=0V, T_j=25°C	-	0.1	1	μA
		V_{DS}=600V, V_{GS}=0V, T_j=150°C	-	100	-	μA
Gate source leakage current	I_{GSS}	V_{GS}=±20 V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS\ (on)}$	V_{GS}=10V, I_D=5A, T_j=25°C	-	0.315	0.36	Ω
		V_{GS}=10V, I_D=5A, T_j=150°C	-	0.85	-	Ω
Gate resistance	R_G	f=1 MHZ, open drain	-	3	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, f=1 MHz, V_{DS}=25 V	-	1083	-	pF
Output capacitance	C_{oss}	V_{GS}=0 V, f=1 MHz, V_{DS}=100 V	-	53	-	pF
Reverse transfer capacitance	C_{rss}	V_{GS}=0 V, f=1 MHz, V_{DS}=25 V	-	12	-	pF
Transconductance	g_{fs}	V_{DS}>2*I_D*R_{DS}, I_D=5A	-	7	-	S
Turn-on delay time	$t_{d(on)}$	V_{DS}=380V, V_{GS}=10V, I_D=5A, R_G=4Ω (External)	-	16	-	ns
Rise time	t_r		-	7.7	-	ns
Turn-off delay time	$t_{d(off)}$		-	74	-	ns
Fall time	t_f		-	5.2	-	ns

Parameter	*Symbol*	*Conditions*	*Values*			*Unit*
			Min	*Typ*	*Max*	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DS}=480 V, I_D=10A, V_{GS}=0 to 10 V	-	6	-	nC
Gate to drain charge	Q_{gd}		-	13	-	
Gate charge total	Q_g		-	40	-	
Gate plateau voltage	$V_{plateau}$		-	5.4	-	V
Reverse Diode						
Continuous forward current	I_S	V_{GS}=0V	-	-	10	A
Diode forward voltage	V_{SD}	V_{GS}=0V, I_S=I_F	-	0.9	1.2	V
Reverse recovery time	t_{rr}	V_{RR}=300V, I_S=I_F, d_{iF}/d_t=100 A/µS	-	281	-	ns
Reverse recovery charge	Q_{rr}		-	3.9	-	µC
Peak reverse recovery current	I_{rm}		-	29	-	A

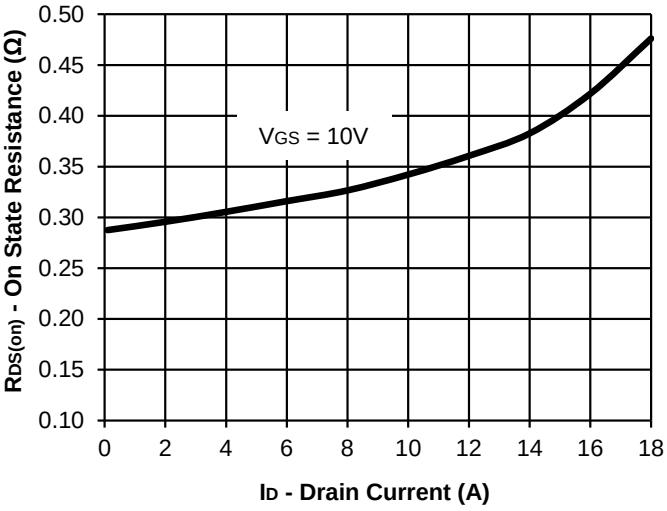
Output Characteristics



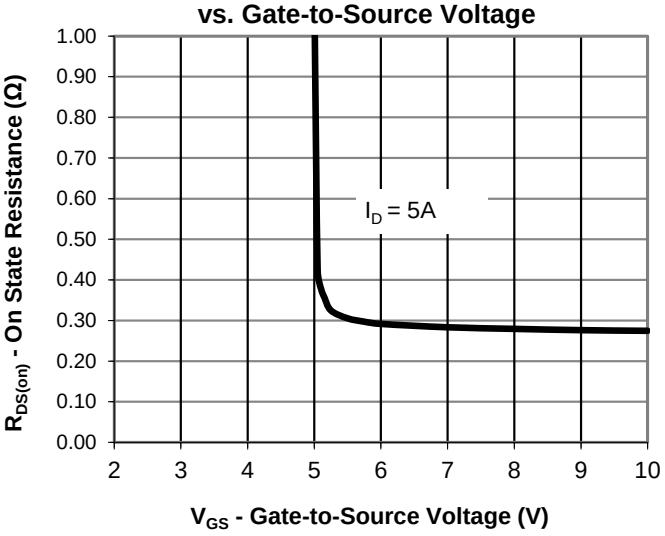
Transfer Characteristics



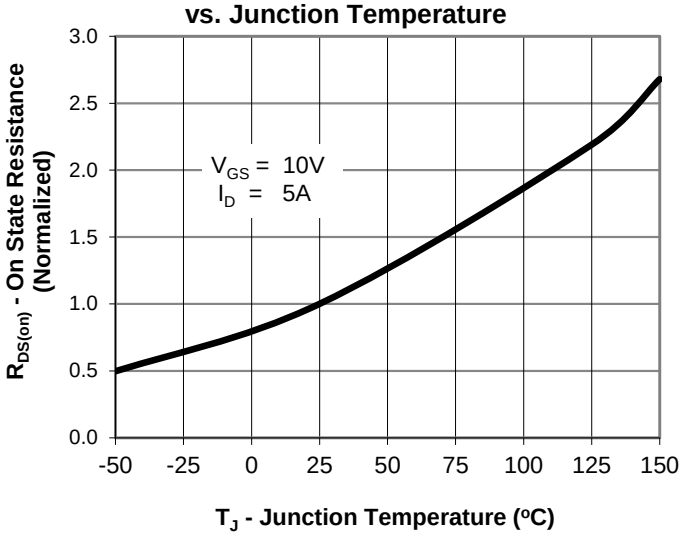
Drain - Source On-State Resistance vs. Drain Current



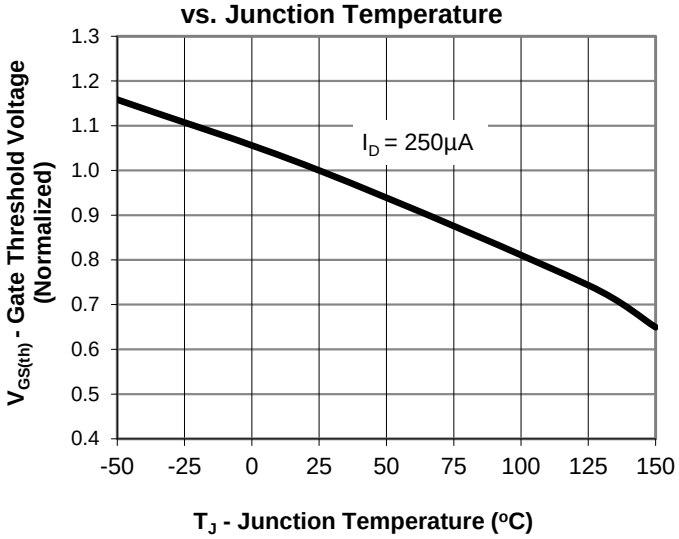
Drain-Source On-State Resistance vs. Gate-to-Source Voltage



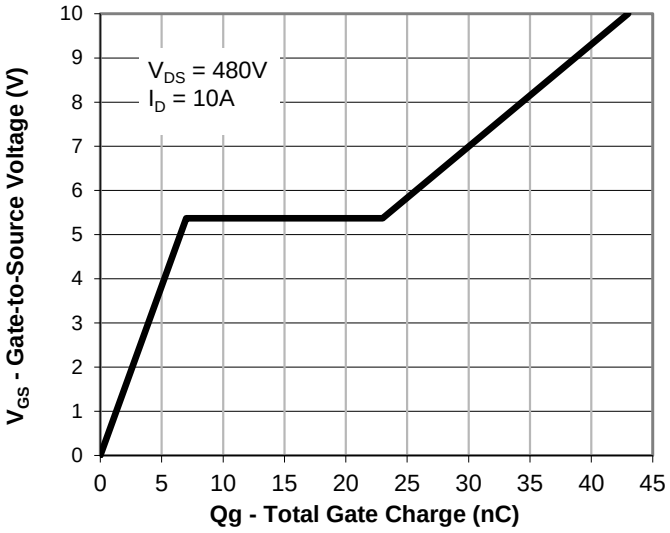
Drian-Source On State Resistance vs. Junction Temperature



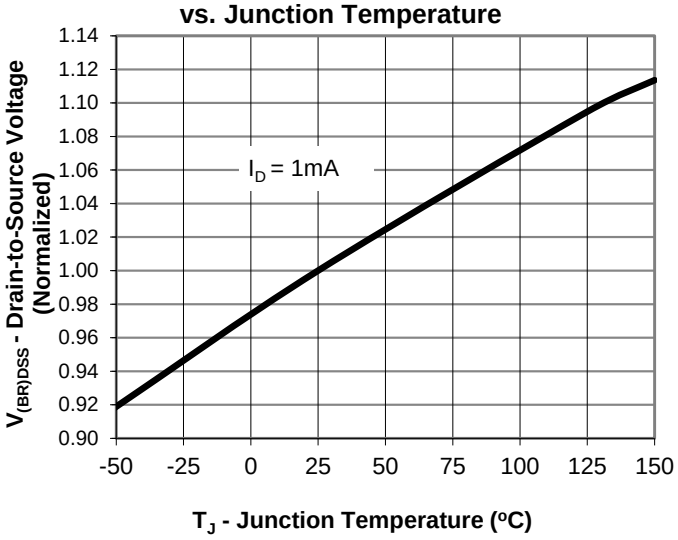
Gate Threshold Voltage vs. Junction Temperature



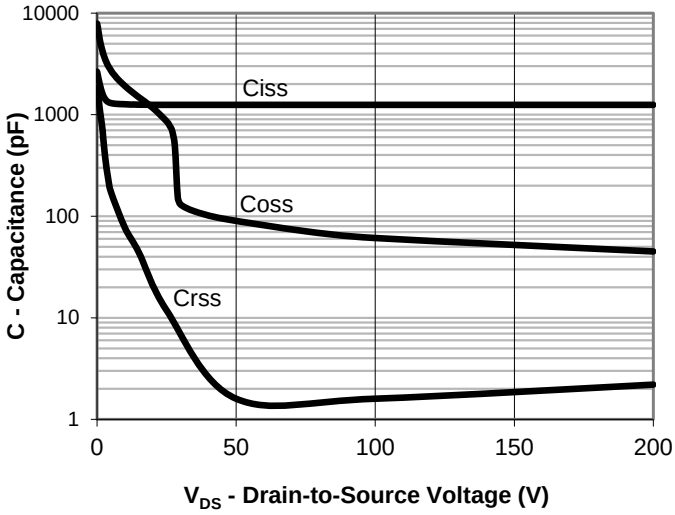
Gate Charge



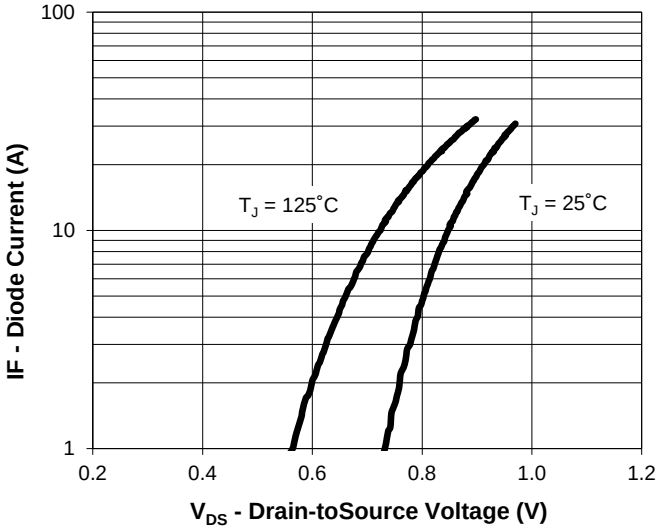
Drain-toSource Breakdown Voltage vs. Junction Temperature



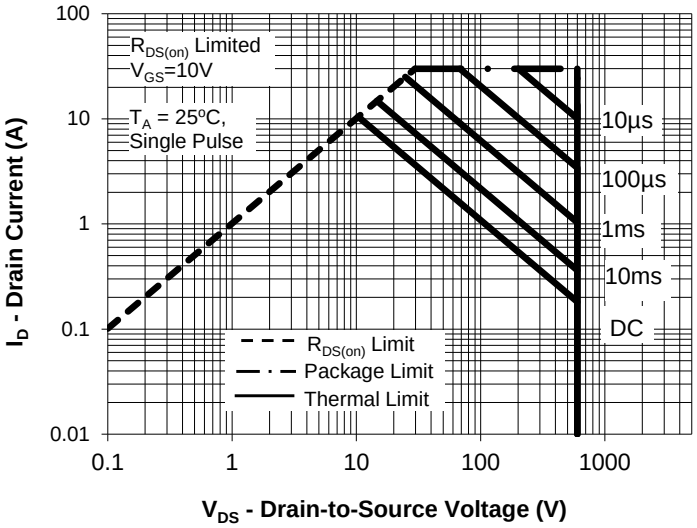
Capacitance



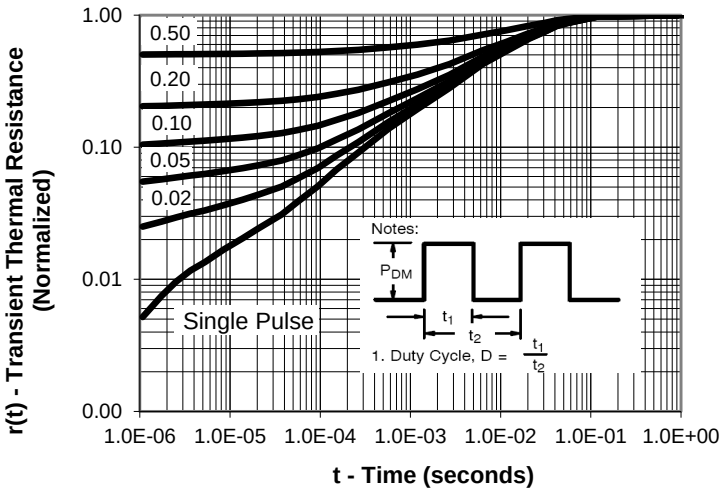
Drain-Source Diode Forward Voltage



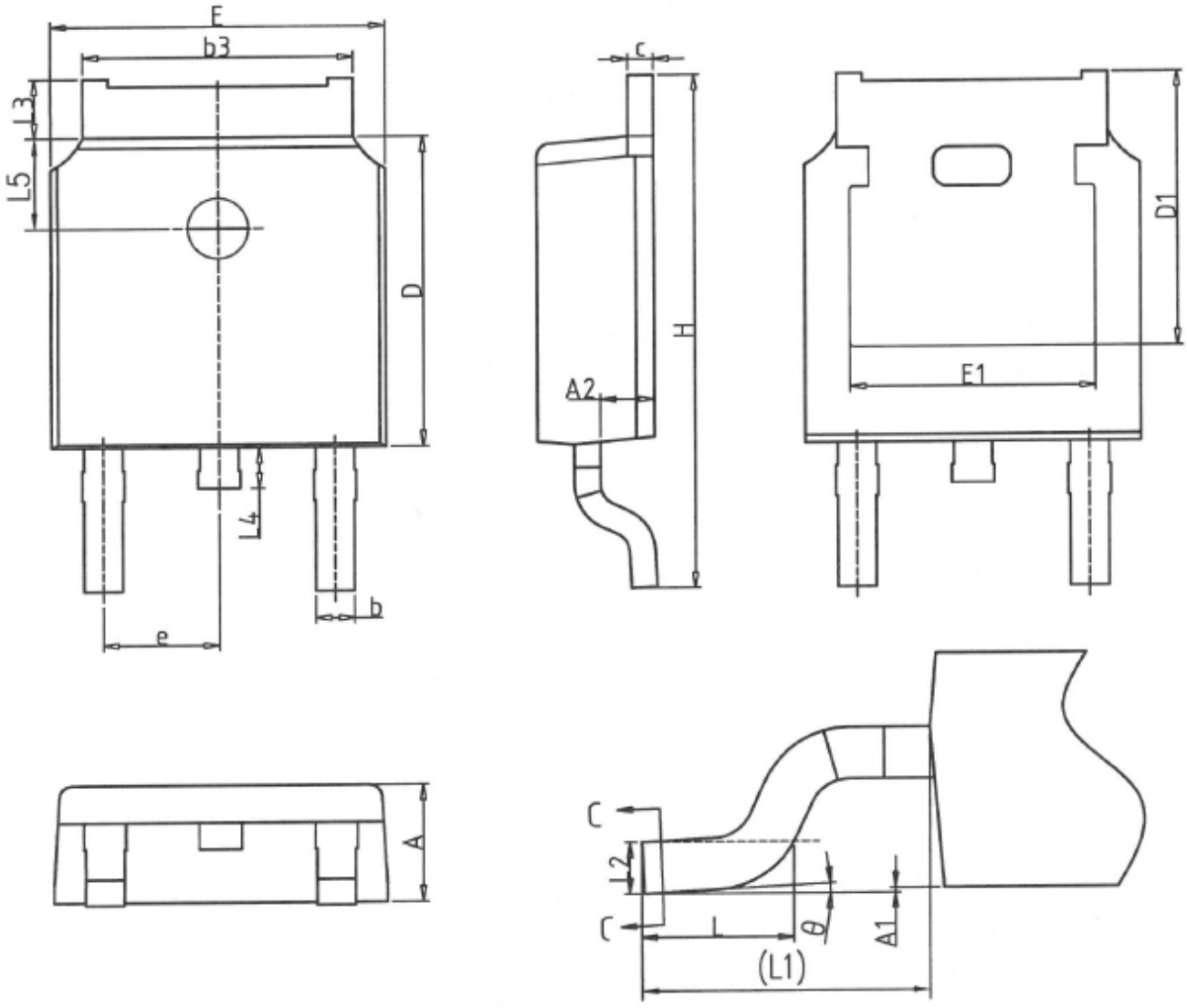
Maximum Rated Forward Biased Safe Operating Area



Transient Thermal Response, Junction-to-Case



Package Outline: TO252 (DPAK)



Package Outline: TO252 (DPAK)

SYMBOL	unit : mm		
	Min.	Nom.	Max
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°		8°

Marking Information

YY = Last two digits of the year

WW = Work week

***** = Site ID

XXXXX = Lot ID

ICES10N60 = ICE is IceMOS logo and S10N60 is a designated device part number

Disclaimer

Information contained in this data sheet shall in no event be regarded as a guarantee of conditions or characteristics. All product, data sheet are subject to change without notice to improve reliability. ICEMOS technology will not be responsible for damages of any nature resulting from the use or reliance upon the information contained in this data sheet.